Lending of Last Resort, Moral Hazard and Twin Crises:
Lessons from the Bulgarian Financial Crisis 1996/1997

By: Michael Berlemann, Kalin Hristov and Nikolay Nenovsky

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Abstract:

In 1996/1997 Bulgaria was hit by a severe financial crisis, spreading from a banking crisis to a currency crisis. While being widely neglected by the financial crisis literature and the international discussion we argue that the Bulgarian Financial Crisis might serve as an illustrative example of a twin crisis primarily (but not only) due to systematic moral hazard behaviour of the banking sector. Thus, the Bulgarian Financial Crisis might be closer to the story of third generation moral hazard models of currency crises than the Asian Crisis. We also show how Bulgaria managed to overcome the crisis by introducing a second generation currency board allowing the central bank to act as a strictly limited lender of last resort thereby (hopefully) making the country less prone to a financial crisis in the future.

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Non-technical summary:

During the last decade a considerable number of countries experienced some sort of financial crises, most prominent among them the European exchange rate crisis of 1992-3, the Tequila crisis of 1994-5, the Asian crisis of 1997-8 and the Brazilian crisis 1998-9. Very recently, Argentina decided to give up its currency board arrangement and decided to let the Argentine peso devalue against the former reserve currency, the U.S. Dollar. Thus, the crisis problem was one of the dominant problems of the 1990's (Bordo et al. (2001), p. 53) and – at least at a first glance – it seems not to be surprising that both, the public as well as the scientific community started caring about the crisis issue. Even if the impression that the crisis problem grew more severe during the last decade might be wrong it is out of the question that the recent crises triggered the development of a considerable number of theoretical models trying to explain why financial crises occur and how they might spread to other countries.

In this paper we deal with a crisis, that has widely been neglected in the (international) financial crisis literature up to now: the Bulgarian Financial Crisis of 1996/1997. The relatively low level of international interest in the Bulgarian crisis might have different causes. One of the major reasons surely is that Bulgaria is a small country that neither was nor actually is part of the European Community. In addition to that Bulgaria is not an important trade partner of the major European countries and did not even face significant foreign direct investments. Thus, international investors did neither worry very much about a possible Bulgarian crisis nor did they fear that such a crisis could infect other economies of international investors' interest. Last but not least the Asian Crisis started to evolve soon after the Bulgarian Financial Crisis and attracted almost all public and scientific interest. Soon after the onset of the Asian Crisis it was noticed that first- and second generation models of currency crises were only partially capable of explaining the Asian Crisis. This shortcoming resulted in the recognition that the banking sector might have played an important role in the Asian Crisis and led to the development of a new generation of financial crisis models, the so-called third generation models. Only a few years later serious doubts evolved whether the banking sector played a decisive role with respect to causing the Asian Crisis. Krugman, who himself inspired one of the two major strands of third generation models (so-called moral hazard models), recently proposed a different point of view

when focusing on the role of companies' balance sheets in determining their ability to invest, and that of capital flows in affecting the real exchange rate.

We suppose that the low degree of interest that has been spent to the Bulgarian Crisis is a shortcoming since this crisis might serve as an illustrative example for a so-called "twin crisis" (i.e. almost simultaneous occurring banking and currency crisis), as explained by many third generation currency crisis models. We argue that the Bulgarian Financial Crisis can best be classified as a twin crisis primarily (but not only) due to substantial moral hazard behavior of the banking sector, as described by the theoretical models of Dooley (1997) and Krugman (1998). Thus, the Bulgarian Financial Crisis might be closer to Dooley's (1997) and Krugman's (1998) story than the Asian Crisis actually is. The Bulgarian example is also useful with respect to learn about the possibilities to overcome a financial crisis and the design of a financial system in a transition country that is (hopefully) less prone to financial crises.

1. Introduction

During the last decade a considerable number of countries experienced some sort of financial crises, most prominent among them the European exchange rate crisis of 1992-3, the Tequila crisis of 1994-5, the Asian crisis of 1997-8 and the Brazilian crisis 1998-9. Very recently, Argentina decided to give up its currency board arrangement and decided to let the Argentine peso devalue against the former reserve currency, the U.S. Dollar. Thus, the crisis problem was one of the dominant problems of the 1990's (Bordo et al. (2001), p. 53) and – at least at a first glance – it seems not to be surprising that both, the public as well as the scientific community started caring about the crisis issue. Even if the impression that the crisis problem grew more severe during the last decade might be wrong[5] it is out of the question that the recent crises triggered the development of a considerable number of theoretical models trying to explain why financial crises occur and how they might spread to other countries.[6]

In this paper we deal with a crisis, that has widely been neglected in the (international) financial crisis literature up to now: the Bulgarian Financial Crisis of 1996/1997. The relatively low level of international interest in the Bulgarian crisis might have different causes. One of the major reasons surely is that Bulgaria is a small country that neither was nor actually is part of the European Community.[7] In addition to that Bulgaria is not an important trade partner of the major European countries and did not even face significant foreign direct investments. Thus, international investors did neither worry very much about a possible Bulgarian crisis nor did they fear that such a crisis could infect other economies of international investors' interest. Last but not least the Asian Crisis started to evolve soon after the Bulgarian Financial Crisis and attracted almost all public and scientific interest. Soon after the onset of the Asian Crisis it was noticed that first- and second generation models of currency crises were only partially capable of explaining the Asian Crisis. This shortcoming resulted in the recognition that the banking sector might have played an important role in the Asian Crisis and led to the development of a new generation of financial crisis models, the so-called third generation models. Only a few years

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[5] Compare the analysis by Bordo et al. (2001) for his aspect.

[6] We will review this literature in the second section in length.

[7] In fact, Bulgaria currently prepares to be admitted for EU-accession in the second round of EU-eastern-enlargement.

later serious doubts evolved whether the banking sector played a decisive role with respect to causing the Asian Crisis. Krugman (1999a), who himself inspired one of the two major strands of third generation models (so-called moral hazard models), recently proposed a different point of view when focusing on the role of companies' balance sheets in determining their ability to invest, and that of capital flows in affecting the real exchange rate.

We suppose that the low degree of interest that has been spent to the Bulgarian Crisis is a shortcoming since this crisis might serve as an illustrative example for a so-called "twin crisis" (i.e. almost simultaneous occurring banking and currency crisis), as explained by many third generation currency crisis models. We argue that the Bulgarian Financial Crisis can best be classified as a twin crisis primarily (but not only) due to substantial moral hazard behavior of the banking sector, as described by the theoretical models of Dooley (1997) and Krugman (1998). Thus, the Bulgarian Financial Crisis might be closer to Dooley's (1997) and Krugman's (1998) story than the Asian Crisis actually is. The Bulgarian example is also useful with respect to learn about the possibilities to overcome a financial crisis and the design of a financial system in a transition country that is (hopefully) less prone to financial crises.

The paper is organized as follows: the second section deals with an overview of the theoretical literature on financial crises. In the third section we describe the process of transformation in Bulgaria from a centrally planned to a market economy from 1990 to 1996. Thereby we focus on the development of basic macroeconomic variables like GDP, unemployment, international trade and inflation. We also shed a light on the development of the process of privatisation, the banking sector and the specific role of the central bank in the transitional phase. The fourth section is devoted to the 1996/1997 Bulgarian Financial Crisis starting out with a severe banking crisis and later on leading to a currency crisis (thereby reinforcing the problems of the banking sector). After a description of the dynamics of 1996/1997 we make an attempt at classifying the Bulgarian crisis with respect to the theoretical models reviewed in section 2. Section 5 deals with the Bulgarian way to resolve the crisis and to stabilize the economy by introducing a currency board arrangement. Special attention is attached to the peculiarities of the Bulgarian currency board arrangement that retained some flexibility in order to be able to fulfil a strictly limited role as a lender of last resort. The paper closes with a summary of the main arguments and some conclusions.

2. Theory of financial crises

Principally there are at least two different sorts of financial crises: currency and banking crises. In this paper we make use of the term "currency crisis" whenever an exchange rate heavily devalues in a short period of time. Often such a currency devaluation happens as the result of a so-called speculative attack, i.e. the sudden purchase of large volumes of the referring currency. We will use the term "banking crisis" whenever a substantial number of banking institutions goes bankrupt and/or a substantial amount of bank deposits are lost by failing banks.[8] Often banking crises are inducing also solvent banks to fail because of illiquidity problems.

To be able to classify the Bulgarian crisis of 1996-7 it is necessary to give an overview on the existing literature on the crisis literature, first. When a country or a group of countries suffered a currency crisis it is often claimed by the country's representatives that the crisis is an act of irrationality or, at least, an act of unfairness. The scientific literature on currency crises engaged in developing models showing that this claim is regularly not true, i.e. in these models currency crises are typically the result of rationally acting agents. Within the crisis literature it is standard now to distinguish between so called "first-", "second-" and "third-Generation" models. Recently, some kind of fourth-generation model seems to evolve.

2.1 First generation models

The first formal crisis models build up on work of Salant and Henderson (1978) on the possibilities to stabilize commodity prices via an international agency buying and selling these commodities at fixed prices. Salant and Henderson (1978) argue that such a stabilization system might be subject to a speculative attack whenever the price of the commodity that would prevail in the absence of a stabilization scheme is above the agency's target price. In such a situation speculators have an incentive to buy large amounts of the commodity for the fixed price since they know that the agency has to give up the stabilization efforts as soon as the agency runs out of the commodity. When the speculative attack succeeds, the market price will rise to the shadow price letting the speculators with capital gains. The canonical model of financial crises, as laid out initially by Krugman (1979), simply mimics Salant and Henderson's story. Instead of commodity

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[8] Compare e.g. Miller (1996, p. 384) for a similar definition.

prices, the government tries to fix the exchange rate, e.g. to enhance international trade with major trade partners. To protect the exchange rate peg, the central bank makes use of its stock of foreign exchange reserves. On the other hand the government might be interested in financing its fiscal deficit via monetary expansion. Since the demand for money does not change, individuals carry no interest in holding additional domestic currency and thus exchange it for foreign currency denominated assets. Whenever the government continues to finance its fiscal deficits via monetary expansion the stock of reserves will constantly decrease and, in final consequence, will lead to an abandonment of the exchange rate peg. Thus, it is exactly the inconsistency between the two goals of fixing the exchange rate and financing a fiscal deficit via monetary expansion that might cause a currency crisis. Flood and Garber (1984) showed that the abandonment of the currency peg typically will be enforced by a speculative attack of rationally acting market participants. As soon as the shadow flexible exchange rate, i.e. the exchange rate that would prevail in the absence of the currency peg, is above the fixed parity, domestic speculators can profit in an attack by purchasing foreign exchange from the central bank at the fixed price and reselling it at the market-determined price. However, competition between speculators will ensure that the exchange-rate peg will collapse as soon as the shadow exchange rate equals the currency peg. This kind of currency crisis is often called a "fundamental crisis" since it is a fundamental reason - the existence of a large fiscal deficit - that makes it impossible for the central bank to further stabilize the exchange rate. Without such a fundamental reason no currency crisis will occur in these models.

The problem with the First-Generation models of currency crises is that they represent the government's policy in a very simplistic way. In spite of being able to predict that the policy mix of pegging the exchange rate while financing a budgetary deficit via monetary expansion will lead to an abandonment of the currency fixation the government sticks to this policy thereby forcing the central bank to try to defend the parity up to the last unit of reserves. This somewhat unrealistic assumption gave rise to the development of second generation models of currency crises in which devaluation is a political decision rather than an unavoidable result of policy inconsistencies (compare Drazen (1998), p. 3).

2.2 Second generation models

In order to model the government's incentives more adequately, Obstfeld (1994) cares about the motives of pegging the exchange rate. The government might be interested in facilitating international trade and investment by holding the exchange rate constant (in fact, this is one of the major objectives of currency unions like e.g. European Monetary Union). Pegging the exchange rate might also be interpreted as an attempt to import the credibility in fighting inflation of a foreign central bank (compare e.g. Berlemann (1999), p. 217-222) thereby reaching a low domestic level of inflation. Krugman (1997, p. 3) argues that the relative value of a currency might also be a symbol of national pride and defending this value might be a government's motive when deciding to fix the currency's price. On the other hand there are several reasons why a government might be interested in abandoning a currency peg. As it was already argued earlier, there is not much room for an expansionary monetary policy under a currency peg. Nevertheless a government might be interested in a lax monetary policy to inflate away a large debt burden denominated in domestic currency. It is also possible that downwardly rigid nominal wages are causing high unemployment. Again, an expansionary monetary policy could help to overcome this problem and therefore might be an argument to give up a currency fixation.

Altogether, for a country to adopt a fixed exchange-rate regime, the arguments in favour of a currency peg must outweigh those against the peg at some point in time. However, this does not imply that the situation cannot change in the future. Krugman (1996) argues that even in second-Generation models a very similar story of a fundamental crises might happen. Therefore he supposes a country's fundamental tradeoff in the arguments for and against a currency peg is predictably deteriorating. Thus, it is obvious that the referring country will abandon the peg at some time in the future. Similar as in the first-Generation models a speculative attack is likely to occur as soon as it could succeed since speculative behaviour offers profits in that situation. As in the first-Generation models a currency crisis is in the end the result of an inconsistent policy mix of the government in this case. This is true although the referring country might have thought to be able to defend the parity for a longer time and thus might feel to have been forced to abandon the peg by irrational speculative transactions. Krugman (1997) states in this respect: "In effect, the financial markets simply bring home the news, albeit sooner than the country might have wanted to hear it."

Even if the second generation models principally include the scenario drawn by the first generation models, they also allow an important additional insight: crises can also occur when there is – in fact – no bad development in the fundamentals forcing a country to abandon its currency peg. This might happen if a public lack of confidence in the government's (or central bank's) interest (or ability) to fix the exchange rate itself decreases the chances to succeed in this task. Obstfeld (1994) argues that – if people expect an expansionary monetary policy in the future (which is possible as soon as the peg will be abandoned) – they will demand high rates of interest to anticipate the expected loss of purchasing power. Similarly trade unions will ask for high wage increases when expecting higher inflation during the contract period. Such acts of anticipation are likely to increase the government's incentives to abandon the peg. Thus, a currency crisis might be somewhat self-fulfilling. When agents start to anticipate the consequences of a possibly occurring currency crisis this increases the costs of holding on to the peg thereby further increasing the probability of a currency crisis occurring.

Thus, one of the basic insights of second generation models is that currency crises might also occur in countries having no "bad" fundamentals. Whenever market participants expect a currency crisis to occur and start speculating against the currency the costs of holding on to the peg might increase quickly and induce the government (respective the central bank) to abandon the currency fixation. Thus we have multiple equilibria: those in which market expectations allow to hold the exchange rate constant and those where market expectations are inconsistent with a currency peg.

Altogether, second generation models seem to deliver some kind of justification for the earlier described claims of many countries, hit by a currency crisis, that the crises were not caused by a bad development in the countries' fundamentals but only by some kind of despicable speculation. In this context the question arises what exactly makes the market participants starting to speculate against a currency. In the end it is not malicious behaviour which causes a speculative attack, it is the profit motive together with the expectation that the currency peg will not resist during the near future. The speculators only start their attack when they expect that the country gets into trouble with at least some probability. Therefore a country typically has to exhibit some kind of weakness before its gets subject of an attack (Marion (1999), p. 7), even if this weakness must not have resulted in an abandonment of the exchange rate peg with certainty. As Krugman (1997,

p. 5) states: "It may be small frictions that prevent a subjectively low-probability crisis from ballooning into a full-fledged speculative attack."

However, it is an interesting question how those countries, who must not but may suffer a crisis with some probability get involved into a successful speculative attack, i.e. what exactly induces the market participants to start speculating against a currency. Obviously bad news on the fundamentals can start an attack. Such an attack is not basically different from those described by first generation models. Countries, bad news are coming about, simply change from the group of countries who might suffer a crisis to the group who will suffer a crisis because of bad fundamentals. Less obvious, a crisis can also be caused by effects like contagion or herding behaviour.

2.2.1 Contagion

The term "contagion" is not consistently used in the literature. While authors like Masson (1998, p. 2) speak of contagion only in the case „where a crisis in one country may conceivable trigger a crisis elsewhere for reasons unexplained by macroeconomic fundamentals" we will follow Drazen (1998) in using the term "contagion" in a more general sense. Thus, we will talk of contagion whenever an occurring currency crisis in one country makes a currency crisis in another country more likely. Again in line with Masson (1998) we call the phenomenon that two countries suffer a currency crisis because of the same unobserved common shock (may be at different points in time because of regional differences in the susceptibility to infection) "monsoonal effects", although this case is empirically hard to distinguish from cases of contagion.

In the easiest case, contagion effects can be explained by real linkages between two or more countries (compare e.g. the formal contagion models of currency crises by Gerlach and Smets (1995) and Eichengreen, Rose and Wyplosz (1996)). When one of these countries gets into trouble because of bad fundamentals, the situation in countries closely linked to the crisis-country might be negatively influenced, too. This sort of contagion is sometimes called "spillover" (compare e.g. Masson (1998)). There are several explanations why such spillovers might easily occur. Suppose that two countries are on the one hand highly specialized and on the other hand closely linked via extensive trade. As soon as one of the countries gets into problems to stabilize

its exchange rate it might choose to tighten monetary policy in order to lower the downward pressure on the exchange rate. When doing so, the demand for investment goods from domestic and foreign producers will decline and contribute to a recession in the country of the main trade partner. Thus, the fundamentals of the main trade partner worsen thereby increasing the probability that speculators extend their attack on the referring currency. May be more obvious is contagion by countries who already gave up their peg. Suppose the case of two countries selling very similar products on the world export markets. As soon as one of the countries gives up its peg and its currency starts devaluing the other country will get into serious trouble because the export sector is not competitive anymore. Again a crisis in one country might trigger a crisis in a similar country.

While the above examples concentrate on fundamentally justified contagion effects (the real linkage between the countries is as close that a crisis in one country inevitably causes a crisis in the other ones) it is also possible that countries suffer from rational contagion effects without fundamentally justified reason. A possible reason for such fundamentally unjustified contagion effects is a liquidity shortage of international investors. Whenever international investors face large losses in one crisis country (e.g. because of margin calls) they may be forced to rearrange their portfolio thereby redrawing money from other countries. The smaller the referring market is the more likely such transactions will influence market prices. Thus, contagion effects because of international liquidity shortages are likely to happen in small markets like they are present in emerging markets countries.

It might also happen that somewhat "irrational" reasons trigger contagion effects. One explanation for such irrational contagion effects is that a group of countries might be perceived by market participants as very similar with respect to aspects like e.g. culture though in fact being quite heterogeneous. If one country of this group is suffering a currency crisis market participants might wrongly expect that other countries of the group are also likely to suffer a crisis and start to attack their currencies. This wrong misperception might be due to incomplete or wrong information as well as to unobservable characteristics of the referring countries.

It is also possible that contagion effects occur because of non-economic reasons. Drazen (1998) presents a model of political contagion. He argues that fixing the exchange rate might sometimes, as for example in the EMU, be primarily a political decision. Thus, it is the desire for political integration letting a country enter a system of fixed exchange rates. Taking part in the system is

some kind of precondition to take part in the process of political integration. Drazen (1998) assumes that the value of taking part in the exchange rate arrangement depends positively on who else takes part or may take part. Therefore a country's decision to hold on to an exchange rate peg depends on the respective decision of other countries. Whenever one country decides to leave the exchange rate arrangement, the value of staying in the system strictly decreases thereby making all other countries more vulnerable to a speculative attack. Thus, this sort of contagion, which Drazen (1998) calls "membership contagion", is driven by negative external effects of the decision to use the outside option.

2.2.2 Herding

In an inefficient foreign exchange market a speculative attack might also be started by so-called herding behaviour. The term "herding" in general describes the phenomenon that market participants mimic the behaviour of other market participants. In an examination of the 1987 stock market crash Shiller (1989) found the astonishing result that most individuals sold stocks because they observed stock prices to go down. Such a herding behaviour in foreign exchange markets can easily lead to a currency crisis.[9]

A first argument why herding behaviour might occur is the existence of the so-called "bandwagon effect". Krugman (1997, p. 5) illustrates this effect by an example of three market participants who are invested in a certain country. The first investor has special information on the real estate market in the country while the second investor is well informed on the condition of the banking sector. The third investor has private information on the government's finance. Now assume that the first investor gets some bad news on the real estate market and, in consequence, starts to transfer back at least some of his money. The second investor, who himself got no new information on the banking sector might take the first investor's behaviour as signal that the first investor got very bad news indicating that a currency crisis is likely to occur. Thus he also starts to sell his assets, thereby increasing the pressure on the exchange rate. Last but not least even the third investor, who himself might have got positive new information on the condition of the governments finance, is likely to follow the other investors' example to liquidate

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[9] Compare the basic models of herding behaviour by Banerjee (1992,1993), Topol (1991) and Orléan (1992, 1993).

their investments because he is supposing the bad news to be somewhat overwhelming. Thus, the fact that the first investor initially received bad news might drive the economy into a currency crisis even though the country's fundamentals did not change substantially.

A second argument for the relevance of herding behaviour is that many investments in crisis-prone countries are done by managers of emerging market funds rather than by individuals. The reputation and often also the income of the money manager is linked to the comparative success of the fund. When a manager of a large fund draws back his money from a certain market it is somewhat likely that other managers will follow since there is regularly more to loose than to gain when staying in a crisis currency (Krugman (1997, p. 5)).

A formal model of herding behaviour that builds up on contagion effects caused by international liquidity shortages was presented by Calvo (1999). He argues that gathering information about emerging market economies typically involves large fixed costs relative to the size of investment projects in these countries. Since fixed costs generate economies of scale "financial industry is likely to organize itself around clusters of specialists" (Calvo (1999), p. 3). Thus, there are typically two subgroups of investors: the informed and the uninformed ones. Moreover the highly informed investors are likely to leverage their portfolios by borrowing to finance projects in emerging markets. Whenever the informed investors are subject to margin calls the uninformed investors might misinterpret the informed investors' decision to disinvest as a result of bad news on the country's investment projects. Therefore they might decide to redraw their money from the country as well thereby causing a currency crisis.[10]

2.3 Third generation models

In first and second generation models currency crisis always have to do with the referring countries' fundamentals: while the basic reason for a currency crises occurring in first generation models is a bad development of the fundamentals disabling the government to stick to a pegged exchange rate, in second generation models a shift in market expectations on the current state or the future development of the countries' fundamentals might be enough to generate a currency crisis. In third generation models an additional possible source of instability is added to the story:

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[10] A similar model was developed by Karmann, Greßmann and Hott (2002).

the banking sector. Third generation models are somewhat different from first and second generation models since they do not necessarily focus on solely explaining currency crises. While some of the third generation models predict a currency crisis to occur as the result of a banking crisis, others imply a reverse causation.[11] Since currency and banking crises often occur both together in these models they are also called "twin crises models". But there is also the possibility that a currency crisis is the result of pretending a banking crisis or the other way round.

Interestingly enough, theoretical models explaining banking crises are very similar to the earlier described first and second generation models of currency crises (compare Marion (1999, p. 6). Similar as in first generation models, in Flood and Garber (1981) bank runs are the predictable outcome of commercial banks' inconsistent banking policies. In Flood and Garber's (1981) model commercial banks transform deposit liabilities into reserves and long-term bonds and promise to pay one unit of high-powered money for each unit of deposits on demand. A bank run, for example, might occur as the result of a deflationary central bank policy that undermines the bank's assets' worth. As soon as the bank's liabilities are insufficient to cover their liabilities the bank's depositors will start to liquidate their deposits and the bank goes bankrupt. Analogously to second generation models of currency crises Diamond and Dybvig (1983) showed that bank runs can be the result of a sudden shift in expectations thereby causing the economy to change from a "good" equilibrium of a stable banking system to a "bad" one of a bank run. In this model banks act to improve the allocation of investments. Investors are assumed to be subject to a random preference shock that might cause them to costly liquidate their long-term investments before the referring projects are completed. By pooling the risks resulting from preference shocks via banks the allocation of capital can be improved. While storing the share of total deposits that is rationally expected to be early withdrawn due to preference shocks the remaining deposits can be invested into the long term project. As long as the depositors expect the bank to be safe the "good" equilibrium applies and no bank run occurs. But whenever the depositors expect the bank to be unsafe a "bad" equilibrium might occur in which all depositors try to withdraw their investments early thereby forcing the bank to liquidate all long-term investments, the liquidation value of which is below the total sum of deposits and thereby causes the bank to go bankrupt.

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[11] Compare e.g. Dooley (1997), Krugman (1998), Chang and Velasco (1998), Sachs and Radelet (1998), Buch and Heinrich (1999) or Flood and Marion (2000).

The two major types of third generation models of currency crises basically build up on these two types of models of banking crises. While the so called "moral hazard models" draw on the idea of a policy inconsistency developed in first generation models, "random withdrawal models" build up on some open economy version of the Diamond-Dybvig-model.

2.3.1 Moral hazard

In the first strand of third generation models moral hazard plays an important role.[12] It has long been known that governmental guarantees for financial intermediaries' liabilities might cause serious moral hazard problems (compare e.g. Freixas and Rochet (1999), pp. 267-268). Such intermediaries have a strong incentive to pursue highly risky investment strategies. Within a class of investments with the same net present value and one good and one bad outcome a protected intermediary will choose the one with the lowest probability of success. More generally guaranteed intermediaries will prefer investments with "fat right tails" (Krugman (1998), p. 4) thereby neglecting that the expected return of these investments might be low or even negative. This behaviour is due to the fact that, whenever a bad outcome of the investment project is realized, the losses are "nationalized" while the profits under the good outcome are going to the owners of the intermediary. The reason why the intermediaries can pursue these risky strategies is that the depositors of the financial intermediaries carry no interest in monitoring their deposit institutions since they are protected from losses by the government's guarantees. Thus, whenever the government wants to stick to its politics of guaranteeing financial intermediaries' liabilities it should choose some appropriate system of banking regulation and banking supervision. While the moral hazard problem was first introduced into the financial crises debate in the mid of the eighties by Diaz Alejandro (1985) the argument found not much attention in the debate for a decade.

One of the first models where moral hazard plays an important role is the one by Dooley (1997). In his model governments on the one hand are interested in holding reserve assets (for example in order to self insure against shocks to national consumption), on the other hand the government is interested in protecting the domestic financial sector via acting as a lender of last resort (which

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[12] Compare McKinnon and Pill (1996), Dooley (1997), Corsetti, Pesenti and Roubini (1998) and Krugman (1998).

demands for holding reserve assets, too). Dooley (1997) assumes that governments are credit-constrained, i.e. they can not borrow money on international capital markets without providing collateral in the form of reserve assets (like foreign exchange or lines of credit from other governments or international organizations). In such a situation a country can not credibly promise liquidity insurance to the domestic banking sector if the country's net assets are not positive (net assets equal gross assets minus noncontingent liabilities).

Dooley (1997) illustrates his model at the example of a country with initially negative or zero net reserves. He argues that a macroeconomic shock like a decrease of international interest rates might substantially increase the country's reserve holdings by reducing the value of noncontingent government liabilities. This enables the country to credibly insure the banking sector's liabilities. As it was already pointed out in the beginning of this section, this will induce moral hazard behaviour on the part of domestic banks. Whenever there is no well working system of banking supervision the banks have a strong incentive to seek new deposits by promising above-market yields to the investors. Even if the investors know that the domestic banks will not be able to pay back their full investments they are willing to invest into the country since they expect to be compensated via the government's reserve assets. The situation is stable as long as the government's net reserves are positive. The problem is that net reserves decline in the course of time since banks will have to ask the government for liquidity assistance to be able to fulfil their deposit liabilities. As soon as the net reserves are zero all profits from realizing the government's insurance option are realized and the investors start to draw back their money from the country. This is due to the fact that they know that the domestic banks cannot stick to their promises to pay above market yields because the insurance option is not credible anymore. Thus the attack on the government's reserves itself is generated by competition to avoid losses.

Different from the earlier presented models Dooley (1997) shows that an attack on a country's reserves can also happen as the result of the promise to provide liquidity assistance and without the country's attempt to fix the exchange rate. Nevertheless it is obvious that a country which is running out of reserves will not be able to credibly commit to a fixed exchange rate regime.

Similar to Dooley (1997), Krugman (1998) argues that the collapse of a fixed exchange rate regime might occur as the result of moral hazard due to governmental guarantees to the financial sector without an adequate system of banking regulation and supervision. Krugman (1998) assumes a stochastic production function with decreasing returns to scale with respect to invested

capital. Whenever the government decides to guarantee liquidity insurance in such an environment it is profitable for the intermediaries to invest into the risky investment as long as the return on capital equals the world safe rate of interest in the case of the most favourable outcome of the project. Thus, when deciding on investments, intermediaries take into account the so-called "Pangloss values" (Krugman (1998), p. 6), thereby increasing the capital stock to an inefficiently high level and causing the governmental stock of reserves to decrease via honouring the bank's losses from the overly optimistic investments. Different from Dooley (1997) and the first generation models of currency crises, Krugman (1998) supposes the crisis not to be triggered by an exhausted stock of reserves but by the market participant's expectation that the government will not stick to its promise to bail out private banks in the case of bankruptcy. Thus Krugman (1998) ends up with a story that is somewhat similar to second generation models of multiple equilibria.

2.3.2 Random withdrawals

A second strand of the literature (compare Chang and Velasco (1998) or Radelet and Sachs (1998)) on third generation crises relies on an open economy version of the random withdrawal model by Diamond and Dybvig (1983).

Chang and Velasco (1998) embed the basic Diamond-Dybvig-framework into a three period macroeconomic model of a small open economy. In period 0 each resident is born with a certain endowment and has access to a constant returns long term technology yielding a return of $r<1$ when it is liquidated in period 1 and $r>1$ otherwise. Thus, liquidating the investment in period 1 is costly. In addition to that residents can invest their money in period 0 in the world capital market yielding $r=1$ in either period 1 or period 2. While there are no restrictions for the residents to invest into the world capital market, there is an exogenous credit ceiling for each agent. As in the Diamond-Dybvig-model residents discover their consumption needs not before period 1. When an agent turns out to be of the "impatient" type (which is his private information) he derives utility only from consumption in period 1. If he initially knew to be of the impatient type he obviously would have preferred an investment into the world capital market. Whenever he invested into the long term investment he would liquidate this investments in period 1 to realize the highest possible consumption in this period. If an agent turns out be "patient" he prefers

consumption in period 2. Thus patient agents are clearly better off when investing into the long term investment. Since agents initially do not know their true type they face a non-trivial optimisation problem. In the absence of commercial banks all agents are forced to bear the risk from discovering an unexpected type in period 1.

Again as in the Diamond-Dybvig-model the situation can be enhanced when the agents' endowments are pooled by commercial banks. Commercial banks collect the endowments of the residents as deposits and get the possibility to borrow from abroad up to the aggregate credit ceiling. In exchange the depositors have the right to withdraw money either in period 1 or in period 2, given that the bank is not bankrupt. Chang and Velasco (1998, p. 11) also assume that banks are commited to repay any foreign debt under all circumstances. The law of large numbers enables commercial banks to determine the optimal amount of investment into the long term technology. Because the return of the domestic technology is higher than the world rate of interest the investment into the long term technology increases with larger credit ceilings. Since there is no aggregate uncertainty about the agents' types the bank is not forced to liquidate long term investments leaving all agents better off. Thus commercial banks improve the allocation that could be reached by the agents in isolation.

The problem with this first best solution is that it might be hard to be implemented when there is a sequential service constraint which requires that commercial banks act on a first come-first served basis. In period 1 bank's depositors can be assumed to arrive in random order and may decide to withdraw their deposits from the bank or not – given that the bank is still open. Whenever a depositor decides to withdraw his funds the bank first tries to borrow the necessary funds from abroad (and is successful herein as long as the credit ceiling is not reached) and then starts costly liquidating the long term investments into the illiquid technology. The bank has to close as soon as the withdrawals exceed the bank's total liquidation value in period 1. If the bank survives until period 2 it liquidates all investments, pays back its foreign credits and then honours those agents which not withdrew their deposits in period 1. In this setting a bank run can occur (or, more precise, can be an equilibrium phenomenon) when the bank holds less internationally liquid assets than its implicit liabilities, i.e. the bank's potential short term obligations exceed its liquidation value in period 1. In this case even patient agents might have an incentive to withdraw their funds from the bank in period 1. They will do so whenever they expect that all other patient agents will withdraw their deposits, too. They can do so because the bank is not able to observe

the true type of an agent, i.e. the true type of an agent is private information to the agent. Beside this "bad" equilibrium bank run there is also an equilibrium in which all depositors act in accordance to their type, i.e. withdraw early only in the case that they turn out to be impatient in period 1. Thus, similar as in second generation models, we deal with multiple equilibria. A sudden shift in depositors' expectations might trigger a banking crisis when the financial system is illiquid.

Chang and Velasco (1998, p. 14) show that a bank run can also be triggered by a panic of foreign investors. To be able to serve the withdrawals in period 1 commercial banks rely on foreign credits. But foreign creditors will only be willing to lend in period 1 when they expect the bank to pay back their liabilities in period 2. As long as the above assumption that foreign credits are repaid in any case holds true foreign creditors have no incentive not to lend in period 1. But what if foreign creditors can not be sure to be repaid if the bank gets bankrupt? Chang and Velasco (1998, p. 15) show that creditors may stop lending in period 1 if they all expect that a bank run might occur thereby increasing the probability that, in fact, a bank run takes place. Thus, bank runs can be either caused by domestic depositors or foreign creditors. Another interesting implication of the Chang-Velasco-model is that it is not the total volume of foreign capital invested into the small country that makes the country vulnerable to banking crises but the volume of short term foreign debt (i.e. credits that must not be rolled over from period 1 to period 2).

Up to this point the Chang-Velasco-model is only a model explaining under which circumstances bank runs might occur. But there is only a short way to go to show how the story can be linked to currency crises. Therefore Chang and Velasco (1998 p. 35) assume that residents can consume only when exchanging domestic currency against foreign currency at the central bank. As long as the domestic central bank decides to work as a currency board (i.e. exchanges domestic currency against foreign currency at a fixed rate of exchange) and especially does not extend credit to domestic banks, there will be no currency crisis regardless of a banking crisis occurs or not. But the situation is obviously different when the central bank decides to act as a lender of last resort for the domestic banking system in the case of a bank run while trying to fix the exchange rate against the foreign currency. The conditions under which a financial crisis occurs (i.e. either a banking crisis or a currency crisis) are exactly the same as without the central bank. The decisive point is now which of the two goals the central bank prefers: saving domestic banks or fixing the

exchange rate. When the central bank decides to fix the exchange rate a banking crisis will occur and when saving domestic banks by increasing the volume of domestic currency a currency crisis will occur. Thus, an important implication of the Chang-Velasco-model is that banking and currency crises should not occur together.

2.4 Fourth generation models

Recently, Krugman (1999a) stated to be somewhat doubtful whether the Asian Crisis is adequately described by third generation models, including his own moral hazard model of financial crisis (compare Krugman (1998)). One major point of Krugman's (1999a) criticism is that the real aspects of the economy were widely neglected. Thus these models are incapable to explain phenomenons like the observed reversals in the current accounts the Asian countries experienced. In addition to that Krugman (1999a, p. 36) claims that the development of firm's balance sheets has been neglected in the theoretical discussion while being a point of major interest in practical discussions.

To overcome these criticisms Krugman (1999a) proposes a multiple equilibria model in which domestic firms take on foreign-currency-denominated debt to finance domestic investment projects. A loss of confidence in the domestic industry may lead to a transfer problem, i.e. the necessary reversal of the current account can only be realized by a large real depreciation of the domestic currency. This real depreciation itself worsens domestic firms' balance sheets thereby validation ex post the loss in confidence. Thus, Krugman's (1999a) model is different from the earlier in this paper reviewed third generation models since a deep financial crisis can occur even if there are no problems in the banking sector.[13]

3 The process of transformation in Bulgaria from 1990 to 1996

3.1 The initial conditions and the logic of disequilibria accumulation

In the beginning of the process of transition, the most important and specific Bulgarian drawbacks were two. On the one hand there was Bulgaria's huge external debt (about 12 billions

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[13] Actually Krugman's (1999a) model is much closer to second generation than to third generation frameworks. Recently, Chang and Velasco (2001) also presented a model of monetary policy with balance sheet vulnerability.

UDS in the end of 1990).[14] On the other hand there was a considerable dependence of the Bulgarian external trade mainly by the markets in USSR (in the late 80's Bulgarian trade with USSR represented around 50 percent of all trade flows; compare Dobrinsky (2000)), imposed by the Council of Economic Mutual Assistance (CEMA). The government interfered all spheres of the Bulgarian economy and in spite of some elements of decentralization, the transition from a centrally planned to a market economy was considerably harder than in the rest of the east European countries.

Price liberalization began in February 1991 and at the end of the year inflation reached 474 percent. This surge in prices was first of all due to the necessity of overcoming the artificially suppressed inflation and the so-called monetary overhang. But subsequently, during the period of 1992 to 1996, administrative control of prices again increased (especially with respect to food and essential commodities), resulting in market distortions (OECD (1999)).[15]

The breakdown of the CEMA markets and the large and ongoing losses of the state-owned enterprises were not compensated by the newly set up private business. The negative balances of the state-owned enterprises and banks were transferred to the budget, which consequently led to (i) high budget deficits, (ii) increasing internal debt and (iii) monetization of these losses by the Bulgarian National Bank (BNB). As a result all losses were born by households and *de novo* created private firms, which worked according to market economy principles.

The process of *privatization* in Bulgaria was delayed. Land restitution, launched in 1991, worked very slowly and in late 1996 only 18 percent of land properties were restored to their owners. In 1992, when the Law on Privatization passed and the Privatization Agency was established, the share of the private sector in GDP was only 20 percent (agriculture not included). During the period of 1991 to 1997 only 20 percent of state assets were privatized (OECD (1999)).[16] Small-scale privatization proceeded, particularly in trade, food processing and tourism but no progress

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[14] In a five-year period of 1984 to 1989, Bulgarian external debt increased by 7.8 billion USD (compare Dobrinsky (2000)).

[15] The energy and most of the services prices were also held below international standard levels (Minassian and Nenovsky (1998)).

[16] According to the results of an IMF study the total index of the Bulgarian economy restructuring during 1989 to 1994 is considerably below that of advanced CEECs. The total indices for Hungary (2.6) and for Poland (2.4) where clearly above the one for Bulgaria, which was only 1.4. In the next period (1995 to 1997) the total index for Bulgaria grew to 4.1 while those for Hungary and Poland were 6.5 and 6.2, respectively (Fisher and Sahay (2000)).

was made in privatizing large enterprises in heavy industry and manufacturing. The loss-making *state-owned enterprises* (see table 1) were subsidized by the banking system via direct loans from BNB, or indirectly by issuing security bonds. The delay of privatization, maintaining inefficient productions and transforming the loss into quasi-fiscal liabilities, covered primarily by monetary expansion, was in the interest of public sector interest groups as well as of political authorities.[17] Though a full range of privatization methods was put into practice, the processes of denationalization and of creating efficient markets were lagging behind.

Table 1: Financials results at the state owned firms (1992-1997)
(as a percentage of balance sheet's assets)

	Net profit				
Year	Industry	Construction	Transport	Trade	Others
1992	-7.87	0.26	0.08	-1.62	0.00
1993	-12.74	-2.17	-6.99	-1.14	-4.96
1994	-4.89	-2.14	-3.28	0.43	5.37
1995	-4.24	-1.14	-5.23	-1.31	1.10
1996	-5.54	-1.18	-5.85	-1.78	-6.71
1997	2.89	0.99	3.43	2.30	2.50

Source: OECD (1999, p.79).

In 1997, employment had decreased to 72 percent of its level in 1989. During this period registered unemployment was in between 12 and 16 percent of the labour force. There were clear-cut regional discrepancies[18] between the capital Sofia and rest of the towns on the one hand, and between big towns and small towns and rural areas on the other hand. Both can be viewed as a consequence of the pre-1989 structure when small or middle towns depended on one or two industries.

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[17] See Koford (2000) for a detailed survey of the Bulgarian process of transition. He uses Mancur Olson's theoretical approach, which presents politicians and bureaucrats as different types of bandits (compare also Frye and Shleifer (1996)).

[18] A detailed analysis of regional discrepancies is made in the Human Development Report by UNDP (2000) which presents for the first time the municipality index of human development with very low values in most of the regions.

Consequently, *GDP* continuously went down to 66.5 percent (1997) of its level in 1989, with the most severe drop in the period of 1995 to 97 (-17.1 percentage points – National Statistical Institute (1999)).[19] *Investments* slumped and in 1997 they were on a level of only 13.9 percent of GDP, which was only 55 percent of the level in 1991. Households consumption had been decreasing throughout, whereas saving decreased from 60.3 percent of GDP in 1990 to 19.2 percent in 1997. The government was impeded by tax base contraction and low tax collection (tax revenues in percent of GDP declined from 50 percent of GDP in 1989 to 26.5 percent in 1996). In late 1996 internal and external debt reached alarming levels (60 percent respectively 243 percent of GDP; compare also table 2).

When analyzing the Bulgarian Financial Crisis of 1996/1997 it is important to have a close look at the process of profit- and loss-, asset- and liability-transfers from another perspective. There was a struggle among different groups of economic agents for deriving self-favors from the transition process and even for manipulating it (see Koford (1999) and Nenovsky and Rizopoulos (2002)). This struggle for economic power was incorporated into the political process of the country, resulting in a period of political instability (during the studied period as many as 7 cabinets were assigned).

Table 2: Dynamics of government and government guaranteed debt (1991-2000)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Dom. debt/GDP	13%	19%	37%	52%	39%	60%	16%	14%	14%	7%
For. debt/GDP	168%	127%	109%	129%	73%	243%[*]	91%	72%	78%	72%

Source: BNB, Fiscal Services.

* Lev devaluation should be taken into account

Altogether, the period from 1990 to 1996 can be seen as a period of accumulation of huge microdisproportions resulting in macrodisequilibria and ending up in the 1996/1997 crisis. The occurring local and temporary crises during 1994 and late 1995 were overcome by general stabilizing IMF programs, although almost none of them was finalized (Yotzov (2001)).

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[19] At the end of 1996 the GDP of Bulgaria was 25% of the average one in OECD countries while for example the GDP of Czech Republic was 64%, of - Hungary 47%, and of Poland – 35% of the average level in OECD.

3.2 Development of the banking system

At the end of 1989 large-scale restructuring of the Bulgarian financial and banking system began[20], reflecting the need to shift to a modern two-tier banking system typical of a market economy. The sector-specific banks were transformed into classical commercial banks, accepting deposits from individuals. These banks were separate legal entities, making loans to households and all sectors of the economy. The existing 59 branches of the BNB were transformed into autonomous commercial banks. The Post Bank was recreated. By early 1991 the banking system comprised the BNB, the State Saving Bank (SSB) and 69 commercial banks organized as autonomous joint stock companies (compare table 3 for empirical data on the development of Bulgaria's banking sector). With the adoption of the Law on the BNB in June 1991 the roles, objectives and functions of the BNB and the commercial banks were redefined. The new Law formally granted the BNB independence from the government and set objectives and functions typical of those of modern central banks.

Table 3: Development of the Banking System in Bulgaria

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Number of banks	70	53	56	37	42	44	45*	34	34	35
Number of privately owned banks	1	3	6	10	18	22	23	28	29	29
Foreign Banks	0	0	0	0	2	4	7	9	10	19
Market share (assets) of largest banks (number of banks in parenthesis)	n.a	77.8% (6)	74.8% (8)	81.6% (13)	78.5% (13)	74.9% (7)	67% (7)	75.4% (7)	70.4% (7)	70.2% (7)

Source: BNB Annual Reports

* Banks in liquidation are included.

In March 1992 the Law on Banks and Credit Activity was adopted. This law established the regulatory framework for the activities of banking institutions. Under this law commercial banks were granted either a restricted license or a full license. Banks with a restricted license were

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[20]Parts of this section are inspired from one of our former studies (compare Caporale et al. (2002)). The paper also includes a more detailed description of Bulgaria's banking system before 1990.

allowed to operate only within the national boundaries. Banks with a full license were permitted to operate both domestically and internationally.

BNB adopted a liberal licensing policy. By the end of 1992, there were 56 commercial banks. The large number of commercial banks and the low capitalization levels of many banks generated interest in banking sector consolidation. The first stage of consolidation took place through the Bank Consolidation Company (BCC). BCC was founded in 1992 in order to consolidate, restructure and privatize state owned commercial banks. While the BCC was not equipped with the appropriate staff and financial resources, needed to achieve its ambitious goals, especially in the area of privatization, it assisted in the consolidation of several banking groups. The first consolidated bank, the United Bulgarian Bank (UBB), was formed at the end of 1992 from the merger of 22 smaller banks. The second wave of consolidation took place in 1993. During this period Expressbank and Hebrosbank emerged. The last wave of the process of consolidation ended in 1995 with the take-over of Sofiabank by Biochim Commercial Bank. BNB also pursued a policy of promoting consolidation of private commercial banks by raising minimum capital requirements. This policy did not result in the consolidation of private banks as these banks were guided by *group interests* and it was difficult to find common ground for consolidation.

After the process of consolidation came to an end the Bulgarian banking sector continued to be dominated by state-owned banks. During the whole period of 1990 to 1996 commercial banks were used by the government to provide implicit subsidies in the form of credits to loss-making state-owned enterprises. Bank balance sheets were further weakened as the BNB continued to provide additional resources to the commercial banks through refinancing. Private banks also expanded their lending to many newly incorporated private companies. Quite often these loans violated the regulatory framework, which was designed to maintain bank solvency by restricting the size of loans and limit the loans to bank officers.

Bankers often lacked sufficient training and internal controls on bank loan decisions were weak. While banks were required to collateralize their loans, the system did not work well. Poor communication among bankers and inadequate data made it more difficult to identify poor credit risks. The courts were also ineffective in convicting borrowers when fraudulent behavior led to loan defaults. Thus, the severe banking crisis of 1996 was also a logical outcome of the failure of banks to adhere to basic principles of sound commercial banking.

As a whole, the prevailing part of the banks were included in various "bandit" coalitions with people from the government, parties and the business. Their sole goal was quick and single enrichment on the account of the public (in Olson's classification those coalitions are called "roving bandits"; compare Koford (2000)). Notions like "connected lending, inside lending, informal lending, inside loan" etc. were common phenomena in Bulgaria at that time (Koford and Tschoegl (1999)).

Furthermore, a policy of restricting the presence of foreign banks had been pursued until 1995.[21] This policy was due to the notion that domestic banks might be incapable to compete with large international banks. In 1994, five years after the launch of the banking sector reform, two branches of foreign banks started operations in Bulgaria (Xios and ING Bank). In 1995 two more foreign banks, BNP-Dresdner Bank and Ionian Bank opened up. An OECD (1999) analysis points out that "[u]ntil 1996, commercial credit was expanded to the non-financial sector in Bulgaria to a degree that was unprecedented relative to any other European transition economy". It should be added that the structure of this credit was not "healthy" and led to the accumulation of a large amount of bad loans (see table 2). With respect to bad loans one and the same cycle was repeated several times (1991, 1992, 1993, 1994, 1996): when they grew up to a large amount or when "somebody benefitted from that", the state "took over" them through transferring government securities denominated in BGN or USD to the banks (compare Vutcheva (2000)). In March 1996, in a desperate attempt to recapitalize several state-owned commercial banks, a new operation was launched. The Ministry of Finance paid Bulbank USD 200 million for ZUNK bonds with a face value of USD 400 million. The securities were then distributed by the BCC as capital contributions to the banks under BCC control. In 1997, immediately before the introduction of the currency board, the government launched a new operation for the recapitalization of Biochim CB. The operation involved the buyback from Biochim CB of ZUNK bonds (which were sold at a price considerably below their face value) with a face value of USD 50 million. The government then issued 18-month government securities, which were purchased by Bulbank.

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[21] Nevertheless some Bulgarian commercial bankers complainted accused foreign banks to have the privilege not to have reserve obligations at the central bank.

3.3 The central bank: Lender of *first* resort

The next level of the pyramid of soft budget constraints was the central bank. BNB played the major role in the mechanism of disequilibria accumulation.[22] As we have already pointed above, BNB became the place where finally the losses of the real sector, budget and the banking system were concentrated.

Despite its *de jure* independence, the central bank was *de facto* totally dependent on the government[23] and on different partisan and corporate interests. Actually there was *de jure* dependence on the fisk because the Law of the Budget is superior to the Law of BNB. The practice showed that this juridical subordination was used for the Ministry of Finance to get the necessary loans. One major example was the direct loan from BNB to the Ministry of Finance at the end of 1996 (with a volume of 7 percent of GDP) which was imposed to BNB by changing the Law of the Budget by the parliament. BNB's behavior did not create any restrictions in refinancing the commercial banks and crediting the Ministry of Finance (MF). BNB rather stimulated the latter to take more money in various forms.

In the period of 1991 to 1996 BNB had virtually no control over the sources of reserve money and respectively on the money supply (Nenovsky (1998)).[24] There were two sources responsible of money supply shocks: refinancing operations by commercial banks and budget financing by the government. In most of the cases the channels of loss monetization were mixed and it was difficult to distingush one from the other.

Commercial banks (CB) were refinanced on a completely subjective and discretionary basis. The various forms of refinancing included: discount refinancing (private securities collateral), lombard refinancing (government securities collateral) and non-collaretal refinancing.[25] It is not exaggerated to state that the central bank played the role of a lender of *first* resort rather than a

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[22]According to the classical analysis by Kornaj (2000) soft budget constraints in Bulgaria in the period of 1990 to 1996 can be grouped as follows: (i) inherited from the socialism and (ii) specific for the transition process (compare the outlook by Maskin and Xu (2001)).

[23] Some authors use the notion of "central bank fiscal dependence" (Sotirova, 2000).

[24] We do not mention BNB influence on money demand since it was never measured (such notion was not even used) and the central bank had no effect on it either through base interest rate changes or through exchange market inteventions.

[25] The features of collateral are of particular significance in transition economies.

lender of last resort. Table 4 shows that the refinancing operations led to a credit portfolio including 75 percent doubtful and uncollectible exposures in the end of 1995. The losses of the banking system were enormous. On 30.06.1994 for example, as many as 35 banks out of 44 were producing losses (Vutcheva (2001)). In between 1990 and 1996 several bancrupt state-owned banks (for instance Agrobiznesbank, TB Yambol) were bought by BNB for the symbolic price of 1 lev.

Table 4. Dynamics of uncollectible credits (in % of total credit) (1993-2000)

	1993	1994	1995	1996*
Standard exposures	7.61	17.69	25.91	43.67
Doubtful exposures (group A)	82.75	66.88	54.55	33.89
Doubtful exposures (group B)	2.19	3.46	4.18	10.67
Uncollectible exposures	7.45	11.97	15.35	11.77
Reported / required statutory provisions	7.18	23.58	23.84	105.42

	1997*	1998*	1999*	2000*
Standard exposures	58.24	69.02	73.26	82.62
Watch exposures	8.59	10.05	9.29	6.47
Substandard exposures	5.86	5.60	2.17	2.99
Doubtful exposures	4.66	1.68	3.25	2.03
Loss	22.65	13.65	12.04	5.89

Source: BNB, Banking Supervision Department

*Banks in liquidations are excluded. Since 1997 (CB introduction) a new classification of loans was adopted.

The Ministry of Finance (MF) regularly took financing from BNB in one form or another. Apart from the direct loans and of government securities sales to the central bank, in fact the budget deficit was financed via a third indirect channel – sales of government securities to commercial banks. The mechanism consisted of several phases. *First*, the commercial banks bought government securities (or obtain them in the above mentioned "rescue operations"). Those securities were used by commercial banks to provide collateral for lombard loans from BNB.

Ministry of Finance paid back its credit to BNB with the money provided by the commercial banks (as a counterpart for government securities). When commercial banks could not buy additional government securities the budget was forced again to sell securities to the central bank or take another direct way of financing. In general commercial banks were used for transferring government liabilities to BNB or to the households (for further details compare Nenovsky (1998)).

Moral hazard behavior was intensified by the deposit insurance scheme introduced in the end of 1995 (Nenovsky and Petrov (2001)). Although the public may have implicitly believed that there already was some form of deposit insurance, there was no formal insurance arrangement during the early 1990s. At the end of 1995 the Managing Board of BNB adopted a regulation for banks to contribute to an insurance fund managed by BNB. In May 1996, when the first commercial banks were closed, the resources of this insurance fund proved to be insufficient. A law protecting deposits at insolvent commercial banks was quickly passed in May 1996. Although the government budget situation did not allow for a further increase in domestic debt, the law was passed to avoid public discontent. The new law covered 100 percent of deposit losses of individuals and 50 percent of deposit losses of legal entities. Under this law the Ministry of Finance issued government securities (denominated in BGN and USD) and entered them into the balance sheet of chosen solvent banks, which should take over the commitment to repay the deposits of failed banks.

The central bank was not all the time aware of the fundamental loss of control over money supply. Officially the Managing Board of BNB stated from time to time to follow a monetary regime of reserve money targeting since 1994.[26] In fact the base intereste rate was raised several times (in most of the cases inappropriately; in September 1996 the base interest rate reached 300 percent) and several currency sales were executed. However, in none of the cases such actions attained the intended results. That policy did not recover money demand for BGN but just left the country with exhausted foreign currency reserves (which decreased to 500 million USD in the end of 1996, i.e. the value of two months' imports).

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[26] Immediately the question occurs how this dynamics was acquired under permanent IMF expertise (for an opinion on this aspect compare Nenovsky and Rizopoulos (2002)).

4. The Bulgarian Financial Crisis of 1996/1997

4.1 The dynamics of the crisis

Due to the fact that the Bulgarian Financial Crisis of 1996/1997 evolved gradually it is somewhat difficult to define the crisis period exactly. The core crisis period was considerably short: it started in May 1996 and ended in February 1997[27]. We suggest May 1996 to be the beginning of the Bulgarian Financial Crisis since it was at that time when the court proceedings for closing several commercial banks began. The end of February 1997 is the end of the crisis since at that time the exchange rate stabilized (even if the currency board arrangement formally started not before July 1997). In March 1997 the inflation rate dropped drastically and economic agents started to take the introduction of a currency board system into account.

Chronologically, the first wave of the crisis came from the *banking system* when in the end of May 1996 BNB took 5 commercial banks, 3 of which were private, under conservatorship [28] The attack on the banks was triggered by depositors' expectations that their foreign deposits would be confiscated or frozen by the government in order to allow it to meet its interest payments on the external debt due in July (there were several indications that the government could do so). The fact that Bulgaria had no agreement with the International Monetary Fund (IMF) in 1996 reinforced this fear. The deposits from the bankrupt banks were transferred to the sound ones and at the same time a Law for Bank Deposit Guarantee passed the Parliament. According to this law the government had to repay the full amounts of individuals' deposits with bankrupt banks and 50 percent of enterprises' deposits (BNB (1996)). At first, individuals were allowed to draw their deposits in BGN before the court declared its decision on closed banks (withdrawals of foreign currency deposits were in portions). The money withdrawn was quickly directed to the foreign currency market where BGN got under pressure. Later on, this permission was abolished and BGN deposits were also blocked. Altogether, throughout 1996 depositors lost more than 50

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[27] Sgard (1999) supposes the crisis period to start in the beginning of December 1996 and to end in February 1997. The crisis chronology can be found only in a few publications; it is broadly covered by BNB annual reports (1996, 1997), BNB Discussion papers (Balyozov (1999)), and partially by Sgard (1999), Nenovsky (1999), Dobrinsky (2000), Vutcheva (2001) and Sotirova (2001).

[28] Private Agricultural and Investment Bank, Mineralbank, First Private Bank and Agrobusinessbank.

percent of their savings. It is interesting to note that 90 percent of the uncollateralized refinancing in the time before the crisis was concentrated in the bankrupt banks. One of the most common reasons that these banks got such a high degree of uncollateralized loans was these banks were of systematic importance to the integrity of the payments system (BNB (1996)).[29]

Figure 1: Refinancing to commercial banks (1991 – 1997)
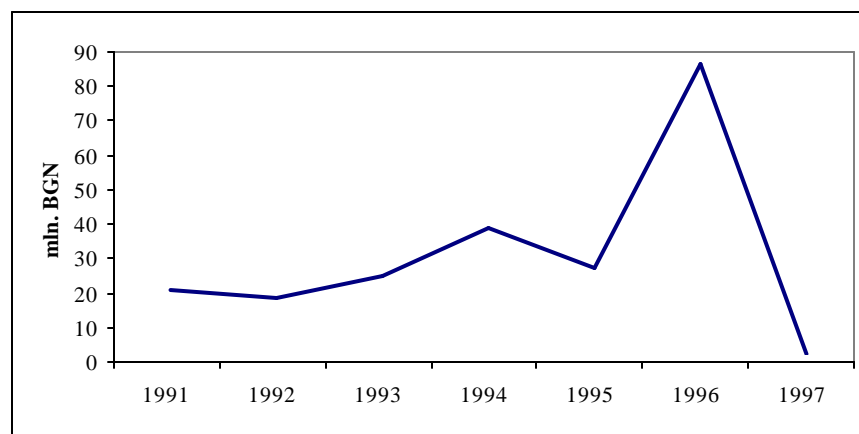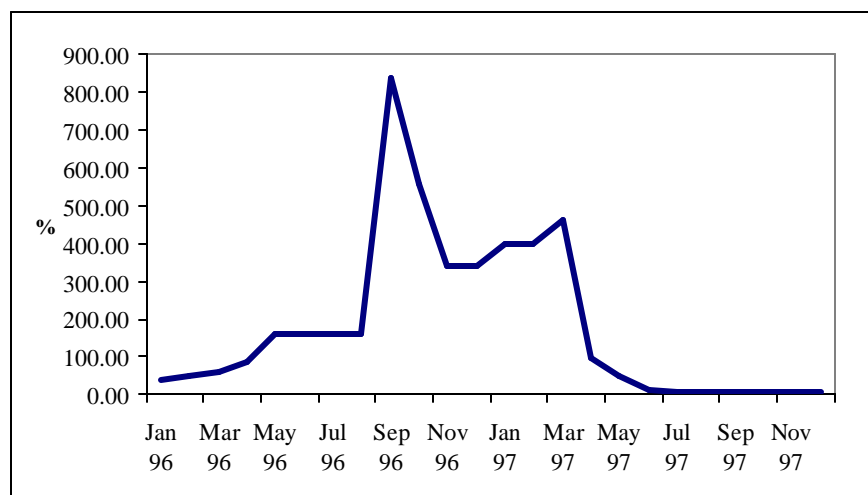

Source: BNB, own calculations

Figure 2: Domestic credit dynamics (1996 – 1997)
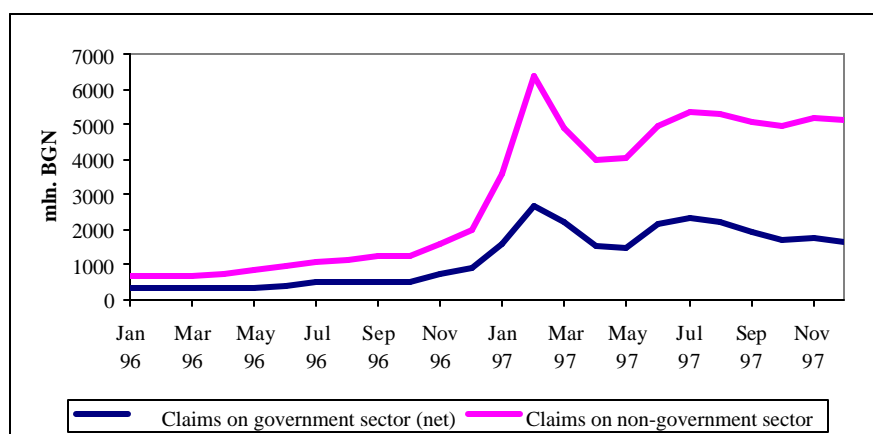
Source: BNB, own calculations

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[29] According to Balyozov (1999) during the whole period of 1995 to 1996 two big state-owned banks regularly obtained refinancing in order to prevent shocks to the payments system. Concerning the role of the payment system in financial crises compare De Band and Hartmann (2000).

Figure 3. Base interest rate (1996 – 1997)

Source: BNB, own calculations

Table 5: Annual interest rate spread and deposits rates (1992-2000)

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Interest Rate Spread	18.3	26.3	37.5	36.1	153.8	129.0	11.1	10.3	9.2
Deposit Interest rate	55.8	52.0	65.1	43.7	146.4	80.8	3.0	3.3	3.0
Spread/Deposit rate	0.3	0.5	0.6	0.8	1.1	1.6	3.7	3.1	3.1

Source: BNB, Miller and Petranov (2001)

At the same time as BNB took the earlier mentioned 5 commercial banks under conservatorship, BNB started raising the base interest rate. In May 1996 the base interest rate was 108 percent (simple annual); in September 1996 it rose to 300 percent, while it decreased twice in October 1996 and reached 240 percent and 180 percent, respectively. At the end of September 1996 another 9 commercial banks were declared to be insolvent.[30] The increase of the base interest rate was partially caused by the BNB's active open market operations (primarily reverse repurchase agreements - repos) in order to withdraw liquidity (Balyozov (1999)). The rise in interest rates caused an avalanche-like increase in the *internal debt* and suspicions of default arose[31].

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[30] Commercial and Savings Bank, Balkanbank, Economic Bank, Businessbank, Elitebank, CB Slaviani, CB Mollow, Dobrich CB and Yambol CB.

[31] A similar dynamics was observed during the Russian crisis in 1998 when the government de facto defaulted on the internal debt (moratorium on GKOs in August). For a detailed analysis compare Chapman and Mulino (2001).

Immediately before the crisis, BNB and DSK (State Saving Bank) were the main players in the interbank market. During the crisis, over 50 percent of the interbank market turnover were frozen in the bankrupt banks. In the third quarter of 1996 DSK (the bank with the biggest deposit base) was forced to redirect its resources to agricultural loans. BNB began to change the minimum reserve requirements in opposite directions. First, it lowered them from 9.5 percent to 8.5 percent and later it began raising them up to a level of 11 percent in December 1996. Throughout this period the bank supervision authorities were powerless, moreover, there were no efficient court proceedings to prove commercial banks' bankruptcies quickly.

Altogether, 14 commercial banks (out of 46) were closed in 1996, which represented 24 percent of the banking system's assets. In the same year the population withdrew 42 percent of its foreign currency deposits and 21 percent of the deposits in BGN, equaling almost 70 percent of Bulgaria's foreign currency reserves[32].

In parallel with the restrictive policy with regard to commercial banks, BNB began to grant direct loans to the Ministry of Finance in order to ensure the huge internal debt servicing resulting from the high interest rate levels. At the end of 1996 the central bank gave several loans to the Ministry of Finance (under a parliament decision) one of which had a volume of 7 percent of GDP. This asymmetry of monetary policy (restrictive to banks and expansionary to the budget) made it ineffective and even more dangerous.

While the first impulse came from the banking system, the banking crisis quickly induced a currency crisis[33]. The devaluation of BGN was accompanied by a dramatic foreign currency reserve decrease (in the beginning of 1996 it was 1236.4 mil. USD and at end of the year - 483.4 mil. USD) and by a short period of hyperinflation. In 1996 the BGN was depreciated by 590 percent. As a whole, the most harsh devaluation of BGN and the highest rates of inflation were scored in the first two months of 1997 (see figures 4 and 5). The monthly chain CPI reached values of 44 percent in January and 243 percent in February and annual inflation for 1997 was

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[32] During the russian crisis (from October 1997 to October 1998) Russia's central bank lost about half of its foreign reserves.

[33] Basically this sequential structure fits well to the Chang and Velasco model (1998) when the central bank prefers to defend the fixed exchange rate instead of taking care on the banking system. Therefore the banking crisis occurs first.

578 percent (BNB (1997)).[34] This hyperinflation was *accompanied* by the classic separation of the two money functions as a unit of account and a medium of exchange. The first function was performed by the US Dollar which were used to fix the prices while the Bulgarian lev carried out the second one by serving as medium of exchange[35] (although a lot of trade was orientated to the US Dollar or the Deutsche Mark).

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[34]There was a sudden drop in inflation in March when the monthly CPI was 12.3 percent and in April the economy experienced deflation (– 0.7 percent). For the second half of 1997, after the establishment of the currency board arrangements, accumulated inflation was 16.2 percent which was quite lower in comparison with inflation in the first half of 1997 (484.2 percent).
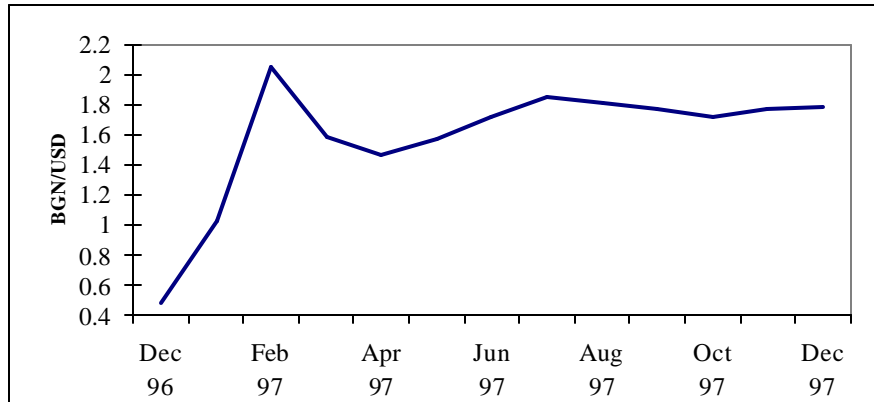
[35] A similar separation was observed during the crisis in Russia 1998.

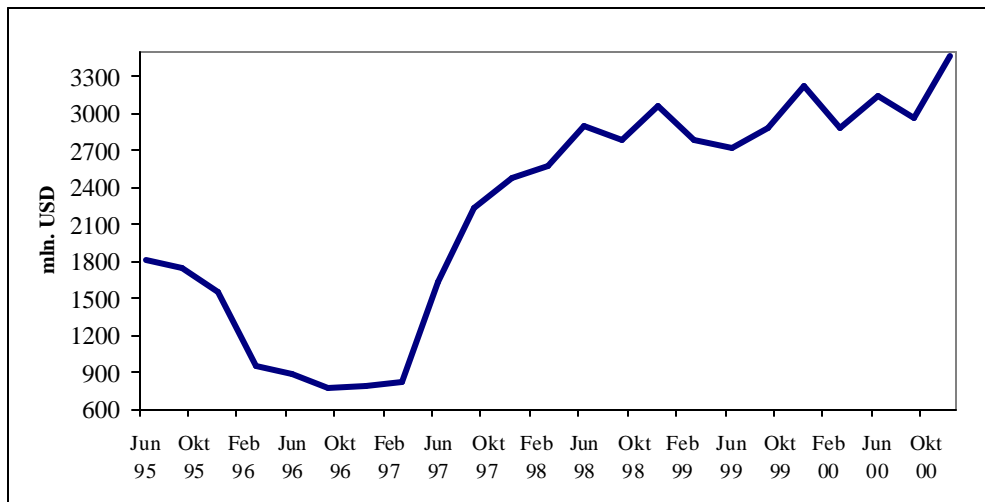Figure 4: Monthly change in consumer prices on previous month during 1997
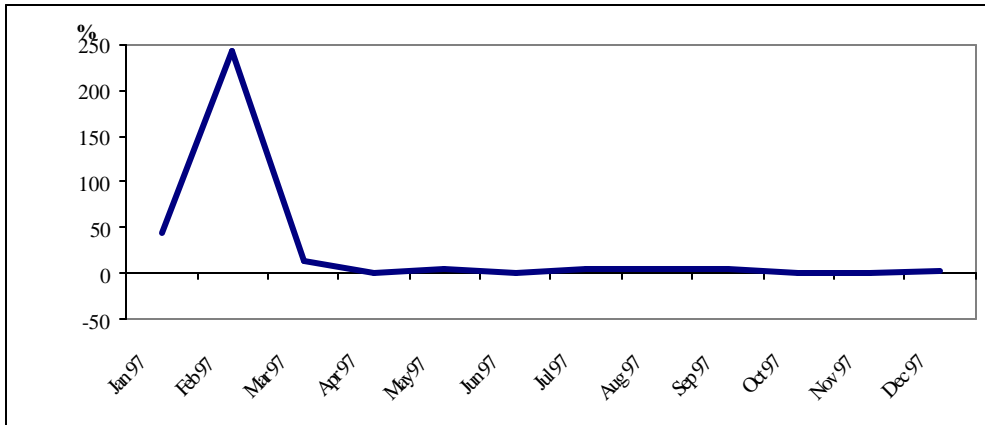
Source: BNB, own calculations

Figure 5: Exchange rate dynamics during 1997

Source: BNB, own calculations

Figure 6: Dynamics in foreign exchange reserves in 1995 - 2000

The general behavior of the population during the crisis period can be depicted by the dynamics of the money-in-circulation/deposits ratio, which steeply dropped.[36] Since Bulgaria (in contrast to other countries in transition) was characterised by a considerably high level of bank intermediation, the costs of the 1996/1997 financial crisis, which included a severe banking crisis, were very high (26 percent of GDP for the period of 1991 to 1998; compare Zoli (2001)).[37]

The financial crisis was accompanied by a deep *political crisis* and mass demonstrations. The social turmoil culminated on 10 January 1997 when the Parliament was attacked. On 4 February 1997 the major political parties took a principle decision to introduce the CB arrangements.[38] The new President took office on 20 January 1997, the socialist party abdicated from power, a caretaker government was appointed and new parliamentary elections were held on 19 April 1997. Under the pressure of the International Monetary Fund (in April 1997 another agreement with the IMF was reached) in the course of time economic agents started to adjust their behavior to the forthcoming establishment of the currency board in July 1997. De facto BNB started to work as a currency board as early as in March 1997.

4.2 Towards a theoretical classification of the Bulgarian Financial Crisis

After having described the crisis the question arises, how to classify the Bulgarian Financial Crisis with respect to the theoretical models reviewed in section 2.[39] This task is not easily to solve because of the intertwining features of the theoretical models. Nevertheless, we suppose the 1996/1997 Bulgarian crisis to be a good example for third generation moral hazard twin crises in

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[36] The "bank reserves/deposits" ratio dramatically decreased, indicating the liquidity shrinkage in the bank system. As a whole this resulted in an increase in the money multiplier.

[37] Many empirical studies show that the higher the share of banking intermediation in the whole financial system is, the higher the costs of a banking crisis are (Hoggarth, Reis and Saporta (2001)).

[38] At some point all political forces competed with each other for IMF liking and to be the ones to introduce the CB arrangement. For a more detailed discussion of this aspect see Nenovsky and Rizopoulos (2002).

[39] The complexity of the Bulgarian crisis has never been subject to special analyses. In their review of the banking crises in transition economies Tang, Zoli and Klytchnikova (2000) point out that Bulgaria is the only transition country where a banking crisis was combined with a currency crisis. Later on, Chapman and Mulino (2001) stressed the "twin crises" elements of Russian crisis.

the tradition of the Dooley (1997) and Krugman (1998) models. In the following we will discuss why we come to this conclusion and which additional features are to be considered.

Obviously the Bulgarian crisis of 1996/1997 was a twin crisis, i.e. Bulgaria suffered both, a banking and a currency crisis.[40] Chronologically, the banking crisis caused the currency crisis thereby reinforcing the problems of the banking sector. But this is only a part of a more complex story visualized by figure 8.

Figure 8: Dynamics of the Bulgarian Financial Crisis
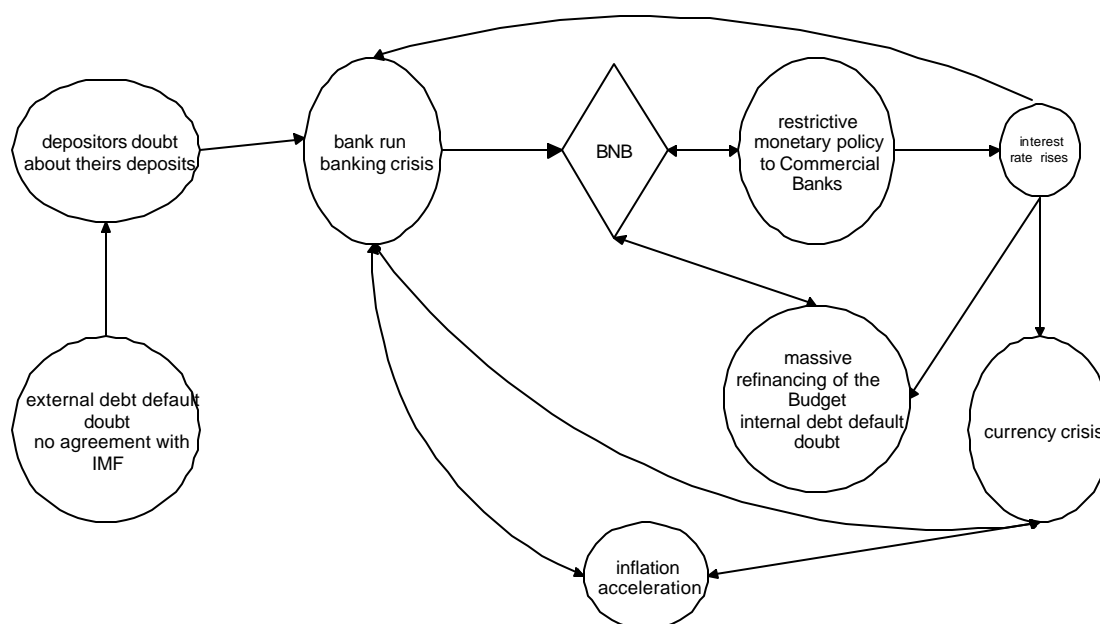
Before turning to a description of figure 8 we first shall discuss the important role, moral hazard played in the Bulgarian Financial Crisis. In the models by Dooley (1997) and Krugman (1998) the government induces moral hazard behavior by credibly committing to use the government foreign exchange reserves to bail out banks with illiquidity problems. As it was pointed out in section 4, the Bulgarian government made such a commitment in July 1996, a few months after the banking crisis started and the first 5 commercial banks were closed. The interesting fact is that this explicit governmental guarantee did not cause but merely reinforced the banking crisis

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[40] It should be stated clearly that it is no prerequisite for a currency crisis that a country announced to fix the exchange rate against a foreign currency. Our definition of a currency crisis simply requires that there is a heavy devaluation of the domestic currency (compare section 2).

by creating additional moral hazard behavior by commercial banks. In the Bulgarian case, the most fundamental cause of the crisis was the existence of some kind of *systematic* moral hazard. It penetrated all economic activities and could be explained by the inherited behavior of being fully secured and guaranteed which dates back to the centrally planned economy. We might talk of some kind of *moral hazard path dependence* of economic agents' behavior.[41] In the previous economic system losses were nationalized and socialized either within the country or within CEMA. Until the crisis there was no formal law guaranteeing bank deposits, but the population expected to be compensated in cases of losses, nevertheless.[42]

Thus, until 1996 in fact all financial companies could rely on an implicit (and later on explicit) 100 percent guarantee from the government. Actually, a great part of the commercial banks were state-owned. State-owned banks' losses were always quickly nationalized. We may recall that the purchases of some bankrupt banks for 1 lev only and rescue operations when the budget took over all losses. It is not surprising that Bulgaria is the East European country with the highest fiscal costs of banking crises (about 42% of GDP). The credit expansion before 1996 was primarily due to this climate of implicit and explicit governmental guarantees and protections. The interest rates on loans (although they were very high at times) did not reflect the true risk of a credit. Most of the loans were granted being aware that they would not be paid back and that banks would not cover the losses (Koford and Tschoegl (1999)). A whole system to draw money from banks and financial institutions was set up in which representatives of the Ministry of Finance, BNB, commercial banks and state and private enterprises participated. A parallel with the classical theory of a lending boom by Minsky (1977) and Kindleberger (1978) and with the disaster myopia model by Guttentag and Herring (1986) might be drawn.

Let us now turn to a description of figure 8 describing the dynamics of the Bulgarian Financial Crisis. The first shock (the beginning of the crisis) was due to the attack on several banks when

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[41] The same is true with respect to the government which in the past relied on USSR and CEMA in critical situations.

[42] A curious fact is that many financial "ponzi" pyramids (offering unusually high interest rates) collapsed, and although the public had been repeatedly warned not to place its money in these "ponzi" pyramids, after their defaults people claimed the government to pay back the lost money as it had been the time before.

the depositors feared that their deposits would be confiscated in order to the government to be able to meet its foreign debt obligations in mid 1996 (see table 6).[43]

Table 6: Debt indicators for "crisis' countries (1996-1997)

Country	Total debt/GDP (1996)	Short-term debt/foreign reserves (All countries 1997, Bulgaria 1996)	Short-term debt/total debt (All countries 1997, Bulgaria 1996)
Indonesia	47%	1.6	24%
Malaysia	39%	0.6	39%
Philippines	51%	0.7	19%
Thailand	50%	1.1	46%
Korea	21%	3.0	67%
Average	*42%*	*1.4*	*39%*
Bulgaria	103%	1.3	11%

Source: Komulainen (2001, p. 17) and BNB (2000).

This change in expectations and the distrust in the government and BNB were triggered not only by the decreasing foreign exchange reserves of the central bank but also by the lack of an agreement with the IMF (note that the government at that time was a socialist one). Bulgaria was unable to get loans in financial markets because of the lack of foreign currency reserves that could be used as collateral. At the same time information about the unhealthy state of several banks spread out and the population was worried that these banks might be closed.[44] The Bulgarian crisis might also serve as an illustration of an inevitable panic period and micro contamination of depositors like in the herding behavior models of Banerjee (1992, 1993).[45]

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[43] The major difference between the Bulgarian and the Russian Crisis is that people in Russia expected that the internal debt service would cease (and it *de facto* ceased temporarily in August 1998).

[44] In the tradition of multiple equilibria models we argue this change in expectations to be the reason why Bulgaria's economy turned from a „good" to a „bad" equilibrium.

[45] Compare also Nenovsky (1997).

Deposit withdrawals turned into panic. In order to stop this panic, the law on bank deposits guarantee was passed (100 percent for physical persons and 50 percent for enterprises), but, as argued earlier, this actually worsened the situation. Further steps were taken with the same purpose: BNB started to pursue a restrictive policy towards banks (after a period of large-scale refinancing) via raising interest rates[46] and at once selling US Dollars to protect the BGN exchange rate.[47] The sharp increase in interest rates in the second half of 1997 (suggested by the International Monetary Fund[48]) intensified the crisis. There was an unexpected change from an extremely loose to a very restrictive bank refinancing policy[49]. This turnabout in the treatment of banks was an additional, considerable shock both to the banks and to the government.[50] The high nominal interest rates caused an avalanche-like increase in the internal debt and suspicions about the government's ability to service it arose. The internal debt became a classic example of "ponzi" financing where new government securities had to be issued in order to make the interest payments on previous issues of government securities. As investors' interest in these new issues was low, BNB was compelled to buy them. In addition to that commercial banks suffered from the increased interest rates and a new round of 9 banks became bankrupt, thereby further increasing the panic. Facing the threat of a moratorium on the internal debt, BNB began to provide extensive monetary financing of the budget deficit (under the pressure by the government and the parliament).

The funds withdrawn from commercial banks and obtained from sales of government were quickly converted into USD what led to a dramatic devaluation of BGN, i.e. a currency crisis. While BNB was not officially maintaining a fixed exchange rate, it was trying to keep the value of BGN by selling foreign currency when BGN started to devalue. Thus, BNB's foreign currency

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[46] It should be noted that the decision to rise the base interest rate was suggested by IMF although the negative side-effects have already been recognized during the former crises in Latin America.

[47] Note that the Dooley (1997) model predicts that such a policy will not be successful in the course of time – what proved to be true in the Bulgarian case.

[48] The rise of interest rates in order to preserve the exchange rate was typical for emerging markets regardless of this measure was suggested by IMF or not (see Chang and Velasco, 2001).

[49] Compare the model developed by Aharony and al. (1986).

[50] The effects of rising interest rates are a major concern in the models of Bensaid and Jeanne (1996), Obstfeld (1996) and Aglietta (1993), as well as one of the leading accusations addressed by Stiglitz (compare Palast (2001)) against the IMF templet programs.

reserves (like in the model of Dooley (1997)) had two functions – to protect both the exchange rate and the banking system against a lack of liquidity. In addition to that and as in first and second generation models, BNB had to finance a large part of the budget deficit, i.e. the central bank had to juggle among three nominal commitments.

Apart form the BGN devaluation, inflation expectations soared as well as inflation itself, coming to a point where the rising exchange rate and the inflation were catching up with and supporting each other. Inflation expectations were influenced by the doubts that the government would use inflation to reduce its BGN-denominated internal debt. The BNB balance sheet was absolutely altered – the net foreign assets dropped to half a million USD while the domestic credit increased a lot. After a period of hyperinflation when the government's internal debt and the liabilities to banks melted away and the population lost almost all savings in BGN, a currency board arrangement was prepared and introduced leading to a sharpe decrease in inflation and a stabilization of the USD-BGN exchange rate.

Table 7: Foreign direct investments (FDI) in Bulgaria (1992-1997)

	Till the end of 1992	1993	1994	1995	1996	1997
Investment projects	69	604	2276	1932	3308	1889
Accumulated	69	673	2949	4881	8189	10078
Annual amount (mln. USD)	34.4	102.4	210.9	162.6	256.4	636.2
Change to preceding year in percent	…	198	106	-33	57	148
Annual amount of investments through privatization (mln. USD)	34.4	22	134.2	26	76.4	421.4
In percent to total FDI	100	22	64	16	30	66
Change to preceding year in percent	…	-78	190	-75	88	120
Accumulated FDI (mln. USD)	34.4	136.8	347.6	510.2	766.6	1402.8
Index, 1992=100	100	398	101	1483	2228	4078
Average amount of investments per project (thousands USD)						
per year	498.6	169.5	92.7	84.2	77.5	336.8
With accumulation	498.6	203.3	117.9	104.5	93.6	139.2

Source: Foreign Investments Agency.

A major prerequisite for a moral hazard crisis occurring, underlined (not only) in the Dooley (1997) and Krugman (1998) models, is the absence of an efficient system of bank regulation and supervision. Bulgaria lacked such a system of efficient bank supervision and bank bankruptcy proceedings. The liberal licensing policy led to the appearances of a great variety of financial agents, most of which turned out to be ponzi pyramids.[51]

It is also important to underline that the Bulgarian twin crisis was mainly a crisis in a closed economy environment. In contrast to the Asian crisis where foreign capital outflows were a

[51] A similar phenomenon was observed in Albania and partially in Romania.

significant element (Mishkin (1999)), we did not observe such capital outflows in Bulgaria. This is due to the fact that over the entire transition period foreign capital inflows (particularly portfolio investments) were on a comparatively low level (compare table 7). Significant portfolio investments (primarily from Japanese banks) were observed not before the de facto introduction of the currency board arrangement in March 1997. In fact, only 204 million USD might be qualified as some kind of capital flight at the end of 1996 (BNB, 1996).[52] According to the BNB register (BNB, 1997) the share of foreign investors in government securities, issued for budget deficit financing, was 12.5% in the end of June 1997 and 11.1% in the end of December 1997. Concerning government securities issued for structural reforms, denominated in BGN and USD, the percentage of foreign investors was 22.6% in the end of June 1997 and 23.9% in the end of December 1997.

On 1st July 1997 the introductory balances of the Issue and Banking Department of BNB were published and this was considered to be the start of the Bulgarian Currency Board. This institutional solution was successful in stopping the Bulgarian Financial Crisis but also induced new problems to be discussed in the following section.

5 Second generation currency boards and lending of last resort

5.1 Second generation currency boards

The features of classic currency boards, typical of the colonial system (we would rather call it *first generation* or *orthodox* currency boards) are well known in broad outlines (compare Schuler (1992) and Schwartz (1993)). An orthodox currency board completely rejects monetary policy. It entails real economy flexibility and balance of payments liberalization. A currency board is backed by a simple and clear rule which determines the relationship between balance of payments, reserve money (or money supply) and interest rate dynamics (compare Hanke and Schuler (1994) and Williamson (1995)). The possibility for discretionary intervention *de facto* does not exist.

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[52] Komulainen (2001, p. 23) did not include Bulgaria in the table described capital account reversals during the financial crises in emerging markets (Asia, Latin America, Eastern Europe, Russia and Turkey) thereby de facto confirming the insignificance of capital outflows in the Bulgarian case.

In contrast to the orthodox currency boards, second generation currency boards preserve the possibility of discretion and of conducting monetary policy.[53] How a second generation currency board gains this flexibility can best be demonstrated at the example of the BNB's balance sheet. The central bank of Bulgaria (BNB) is divided into two departments - an Issue Department and a Banking Department (compare table 8).[54]

Table 8: Issue and banking departments balance sheets

Issue department balance sheet

ASSETS	LIABILITIES
Cash and nostro accounts in foreign currency	Currency in circulation
Monetary gold	Bank deposits and current accounts
Foreign securities	Government deposits and accounts
	Banking Department deposit

Banking department balance sheet

ASSETS	LIABILITIES
Nonmonetary gold and other precious metals	Borrowings from IMF
Investment in securities	Liabilities to other international financial institutions
Loans and advances to banks	Capital
Claims on government	Reserves
Bulgarian's IMF quota and holdings in other international financial institutions	Retained profit
Deposit with Issue Department	

The balance sheet of the Issue Department, which in practice plays the role of the currency board, includes international assets, covering the department's liabilities. The liabilities are comprised of items typical of an orthodox currency board: banknotes and coins, and items typical of second generation currency boards: commercial bank reserves, government fiscal reserves and net worth expressed by the deposit of the Banking Department. The item recording the net worth of the

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[53] Central bank flexibility was preserved in different forms in Hong Kong, Argentina, Estonia, Lithuania and Bulgaria. See Tsang (1999), Caprio et al. (1996), Bennett (1993,1994), Camard (1996), Miller (1999), Haan et al. (2001), Nenovsky and Hristov (2002), Nenovsky et al. (2002), Ho (2002).

[54] This organization follows the model of the Bank of England, likewise divided into an issue department and a banking separtment. The Bank of Estonia has a similar structure. Unlike BNB and Bank of Estonia, the Issue Department of the Bank of England does not hold foreign exchange as a backing for the note issue, but rather domestic securities.

currency board also exists in the orthodox variant but in this case it only plays the role of a buffer which absorbs shocks triggered by asset operations. A positive net worth (expressed by a Banking Department deposit) allows second generation currency boards to perform at least some discretionary monetary policy and provides an opportunity for exercising a strictly limited LOLR-function in the case of systemic banking crisis (see below 5.2).

The Banking Department deposit provides the link between the Issue Department and the Banking Department and also reflects the relationship between the government and the central bank. The relationship between the government and the International Monetary Fund passes through the central bank (article 45 of Law on the BNB). This is due to the fact that drawing rights, received from the IMF, are recorded twice in the balance sheet of the Banking Department. One the one hand the IMF quota is a liability of the Banking department with respect to the IMF, on the other hand it is an asset of the Banking department that is deposited in the Issue Department. Within 90 days of receipt, IMF-tranches are transferred to the government account whereby the Banking Department deposit decreases and the government deposit increases by the same amount. In the balance sheet of the Banking Department this transformation is recorded by crediting the deposit at the Issue Department and debiting the central bank lending to the government item. When the government does not utilize borrowings from the IMF they stay within the Banking Department deposit, thus providing larger funds for the currency board LOLR function.

In principle, money supply under currency board arrangements is endogenous and is determined by the behavior of economic agents. The same rule holds true in setting reserve money and to a lower extent in broad money determination. In the latter case, the gap between money demand and supply is overcome by the changes in the price of money (its purchasing power) and of nonmonetary assets (interest rate, etc.). Under second generation currency boards the main channels of monetary discretion could be divided into two types: traditional and new. The first type is associated with functions inherited from the classical central bank and the second is determined by the specific design of modern, second generation currency boards.

According to classical central bank instruments, in most currency board countries *minimum required reserves* were preserved to different degrees. In Bulgaria and Estonia minimum required reserves are set in the standard way, while in Argentina had so-called liquidity requirements: commercial banks were required to hold a portion of their reserves in high-liquid U.S. securities

(Banco Central de la Republica Argentina (2000)). This leaves room for central bank manipulation of reserve money and money supply through changes in the level and the reporting methodology for commercial bank minimum required reserves. Usually this tool is used quite sparingly though, despite existing opportunities. In the rare cases when this tool is employed it is mainly to respond to a banking crisis triggered by external shocks, rather than as an instrument of exerting discretionary impact on the money supply. The Argentine experience during the Mexican crisis indicates the role minimum required reserves could play under a currency board arrangement (Caprio et al. (1996)). Contrary to other countries, Estonia very often uses the instrument of minimum required reserves. In practice, frequent manipulation of the instrument (more than 10 times since the launch of the currency board in 1991) comes close to central bank discretionary instruments of money supply regulation.[55]

In Bulgaria the level of minimum required reserves was set at 11 percent of the commercial bank deposit base upon the introduction of the currency board and has not been modified till June 2000, despite the country's exposure to adverse external shocks related to the Russian Financial Crisis and the war in Kosovo. In April 1998 the methodology of reporting minimum required reserves was modified to provide more commercial bank autonomy and flexibility in liquidity management. Since July 2000 BNB has decreased minimum reserves requirements from 11 percent to 8 percent. This decision represents the strategic long run policy of the central bank to gradually reduce the reserve requirements to the 2 percent Euro-area level. At the same time the decision was made to centralize government money within the central bank in order to offset shocks generated by the policy of the ministry of finance (establishment of a single fiscal account within the central bank).

A second function of the central bank under a new generation currency board is to serve as a lender of last resort. We draw special attention to the LOLR-function in the following section.

Another discretionary channel of monetary policy under second generation currency boards is given by the choice of liabilities that have to be backed by reserve currency and the degree of

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[55] See Nenovsky et al. (2002) and Sutella (2002). The other peculiarity of the Estonian currency board is the presence of certificates of deposit issued by the central bank (since March 1993). Although it is argued that CDs encourage development of the interbank market (serving as collateral), while being of a small volume, in *strictu sensu* they represent a departure from currency board principles (Aima (1998)). In Lithuania, besides reserve requirement and LOLR function, repo operations with treasury bills and auctions for time deposits were introduced in the summer of 1997.

backing. In first generation currency boards liabilities have to be backed at a 100 percent level and the assets to back currency board liabilities have to be issued by nonresidents. Departures from this principle provide possibilities for the pursuit of discretionary monetary policy.[56] Inclusion of *government fiscal reserves* on the liability side of a currency board (i.e. covering them with international reserves) is the major channel of monetary policy transmission in the Bulgarian and Lithuanian versions of currency boards. Therefore, revenue and expenditure policies have a direct impact on reserve money and money supply. In addition privatization revenues, which are a major part of foreign direct investment inflows in the country, go directly to the government deposit with the central bank. This mechanism creates a kind of automatic sterilization of foreign direct investment inflows as far as the central bank is obliged by law to invest its reserves in securities issued by nonresidents (in the case that those privatization revenues are not used to finance government expenditures). In other words, the government may conduct (intentionally or not) monetary discretion. This mechanism destroys the automatic link between balance of payments dynamics and reserve money dynamics (Nenovsky and Hristov (2002)). Under these circumstances money market disequilibria do not disappear with interest rate adjustment, as they do under an orthodox currency board, but rather require a management of government reserves in the central bank's balance sheet. Using this opportunity, the government is capable of executing discretion, integrating fiscal and monetary policies into a *syncretic* whole.[57]

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[56] The Argentine model of a quasi currency board is indicative of the possibility of conducting monetary policy through establishing a certain limit for liability backing with international assets issued by nonresidents: not less than 66.6 percent. Within the remaining percentage the central bank of Argentina may hold securities issued by the Argentine government

[57] It is a well known fact that the Treasury Departments' activities affect the deposits held with central banks and therefore the liquidity situation in the countries. Extensive research has been conducted to explore treasury of treasury activity on the liquidity conditions and central banks monetary policies (Griffiths and Winters (1995), Hamilton (1997) and Almuina (1999) among others). The main difference under a currency board is that - since central banks do not conduct any kind of monetary policy operations - treasury activities create asymmetric liquidity shocks which could not be offset in practice by the central bank. For instance, Petrov (2000) concludes that treasury operations are the most significant source of shocks on Bulgarian interbank interest rates. Nenovsky et al. (2001) found *liquidity effects* when the fiscal reserve movements impact interbank interest rates. From our point of view major arguments in favor of the inclusion of government reserves on the liability side of the currency board balance are that free movement of capital and high capital mobility cause large capital flow volatility which directly

As we have already argued earlier, the Bulgarian Financial Crisis can be classified as a moral hazard driven crisis. BNB played a key role in the whole system by constantly refinancing commercial banks and the budget and by confusing monetary policy with the LOLR function. The main task of a currency board (as an extreme negation of monetary policy) was to destroy this system and to set strict budget restrictions on banks, the government and consequently on the real sector. Currency boards can just weaken but not eliminate the possibility of a financial crisis[58]. The question arises how a currency board's static characteristics can be combined with the ability to intervene in the case of a banking crisis. We will deal with this aspect in the following subsection.

5.2 Lending of last resort under a currency board

In contemporary financial systems lending of last resort is considered as a narrow part (at different degrees and aspects) of the *safety net* system (Freixas and Rochet (1999)). This is the reason why even under the currency board arrangements, defined as an antithesis to the discretion and "irresponsibility" of the LOLR, it seems to be hard to imagine to go to the opposite extreme and to eliminate LOLR functions completely. Difficulties arose from the fact that the complete intertwining of monetary policy and LOLR, which caused the Bulgarian Financial Crisis, left no room for distinguishing between the two functions.[59] However, currency boards provide an opportunity to return to some old forms of the LOLR.

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influences reserve money and interest rates since they are automatically linked to the balance of payments. Under these circumstances government fiscal policy approximated with fiscal reserve dynamics in the balance sheet of the currency board may offset shocks and help smooth reserve money and interest rate fluctuations. In addition, it is argued that for countries like Bulgaria, which have a relatively high external debt (78 percent of GDP) and large annual service obligations, inclusion of government reserves in liabilities side and their backing with international reserves helps to enhance the currency board's credibility. At the same time, such a design reduces reserve money volatility as large payments on external debt are accommodated by government reserves (Miller (1999)).

[58] Compare the model of banking fragility under currency boards presented by Morin (2002).

[59] Some economists think that such a separation is impossible (Goodfriend and King (1988)), although in the 18th-century Thornton and Bagehot tried to distinguish between them.

First, since the currency board is a rule, it is logical to find analogies to the gold standard. It is well known that in the gold standard monetary system there were different versions of the LOLR (for a survey compare Bordo (1989) or Denise (2001)): (i) in the private banking sector this function was carried out by *private* clearing house associations (White (1999)) or by the so-called branch banking (in the case of USA); or the LOLR was imported by a foreign central bank (Goodhart (1987) argues that this was the case in the period of free banking in Scotland), (ii) under centralized gold standard international LOLR was performed by a *temporary suspension of the rule of convertibility*; it was intended that after the operations the rule would be restored[60] (Bordo and Kydland (1995), Denise (2001)) and (iii) that a central bank could rely on support from *abroad* (Denise (2001)). In the latter case the help may come from a foreign central bank (for example the Bank of England was supported from the Banque de France in 1890, and several more times in the beginning of the 19th century) or from foreign private banks (as during the Barings's crisis in 1889/1890).[61]

Second, under the new generation of currency boards the LOLR feature could be performed in two ways: (i) by *balance sheet positions that are not typical* for the currency board and (ii) by a *separate independent fund* (Caprio et al. (1996)). In the first case these could be some monetary instruments that will appear as internal assets in the currency board's balance sheet (as, for instance the deposit certificates in Estonia and the repo operations in Lithuania) or as some monetary rule within the framework of the central bank.

In the case of *Bulgaria,* BNB may extend loans in BGN to banks through the Banking Department (up to the level of central bank excess reserves) in the event of a liquidity risk affecting the stability of the banking system only to solvent banks experiencing an acute need of liquidity that cannot be provided from other sources. Such loans could be extended only against collateral of liquid assets and the loan repayment term shall not exceed three months. BNB's Regulation N6 defines liquidity risk as a situation where the amount of the ordered but unpaid payment documents in the Banking Integrated System for Electronic Transfer (BISERA) exceeds 15 percent of its total amount for each of the last two days. In addition liquidity risk for the

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[60] In order to guarantee the restoration of the gold parity before 1866 the Bank of England for instance issued the so-called *letters of indemnity*.

[61] It is possible that European Central Bank will carry out the LOLR function for Bulgaria (the country is in a process of EMU accession).

banking system is a condition requiring that an individual bank delays or establishes that it is going to delay the settlement of the payment documents submitted to it for more than three days, and if the bank has at least an eight percent share of all interbank payments for each of the last five business days prior to filing a request for a loan with the BNB (BNB (1999)).

The existence of branches and affiliates of major foreign banks is another opportunity for importing LOLR from abroad. Therefore, the strategy of most currency boards is to open the domestic market for the entrance of foreign banks. This is the experience of Argentina, Estonia and Bulgaria. Argentina is a particular case where the central bank agreed upon bilateral credit lines for financial support with American and other foreign banks.

We will now turn to a discussion of the peculiarities of the LOLR function within the currency board arrangements. We shall consider the four classic features of LOLR defined by Bagehot (1866)[62] as well as some of their contemporary characteristics (Freixas et al. (1999), Scialom (1999)).

In contrast to Bagehot's definition, under the conditions of modern currency boards, LOLR does not imply free (freely) refinancing and imposing a penalty rate, but rather limited refinancing at a penalty rate. According to Bagehot the LOLR should announce in advance that it will refinance freely during a crisis. In most of the contemporary currency boards, the conditions under which refinancing is possible are legally determined and as we have already pointed out, refinancing is not freely, but rather strictly limited (which is the case in Bulgaria). Similar to the advice given by Bagehot, modern LOLRs under the currency board arrangements stick to the principle to grant credits only against very good collateral. Bagehot's principle to support only solvent banks with liquidity problems is realized in the most currency board arrangements while it is often hard to judge whether a certain bank asking for liquidity assistance is solvent or not. This information problem is even harder to solve in the short period of time the central bank has to decide on LOLR assistance (compare Goodhart and Huang (1999), p. 6).

Under the new generation of currency boards, the intense presence of banking supervision, bank regulations and banking court proceedings is a vital part of the safety net. Such a system of efficient bank regulation is both, a prerequisite for the central bank to be able to serve as a lender

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[62] See also Bordo (1989) and Humphrey (1975).

of last resort without creating moral hazard behavior and to compensate for the somewhat limited function of the central bank as a LOLR. It is not surprising that in most of the countries under a currency board arrangement, capital adequacy, liquidity and even equity requirements are significantly higher than those in countries with other monetary regimes.

A well-designed system of deposit guarantee is of crucial importance as an additional part of the safety net. This system should not stimulate moral hazard and it should be more restrictive than it is in countries with discretionary acting central banks.[63] Deposit guarantee is determined by the nature of modern panic, which not always leads to a total contraction of the monetary base (as it was experienced under the gold standard). This panic usually moves deposits from "suspicious" and weak banks to ones of sound reputation (information based bank runs rather than random withdrawals). Such runs were observed during the Bulgarian crisis when depositors transferred their funds to healthy banks like Bulbank and State Savings Bank. There were similar runs throughout the banking crisis in Argentina in 1994/1995 with a currency board in operation but no safety net (Schumacher (2000)).[64] As soon as the crisis evolved depositors reallocated their money to big Argentine and foreign banks.

Under a currency board the *interbank market* is of particular significance for liquidity control and an important element of the currency board mechanism. Taking a closer look at the Bulgarian practice, we observe that the interbank market does not function very well. Banks set up internal regulations for transferring liquidity to other banks case by case. In fact, there is no dialogue among the banks and this is a significant part of the ground for providing mutual aid in the case of a crisis (Freixas et al. (1999)). Above all, this phenomenon could be explained by the lack of trust among commercial banks induced by the 1996/1997 crisis.

Principally it is possible to provide a central bank with LOLR functions even under a currency board arrangement (thereby fulfilling the set of requirements set up by Thornton and Bagehot). But it should be taken into account that any suspension of currency board principles might have severe negative consequences with respect to the credibility of the arrangement (Ho (2001)). Therefore, the Bulgarian currency board is designed to perform LOLR functions up to a certain

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[63] This conclusion is drawn in a review by Garcia (1999). Experience showed that the optimal amount of guarantee is in between once and twice the annual GDP per capita. For details about the specific features of deposit guaranteeing in transition countries compare Hermes and Lensink (2000), and for Bulgaria: Nenovsky and Petrov (2001).

[64] See also Caprio et al. (1996).

limit without violating the basic rules for such an arrangement. LOLR functions can be financed via the Banking Department deposits, i.e. the net value of the currency board, as it is shown in table 9.

Table 9: Example for balance sheets of Bulgarian Currency Board

Balance Sheet of Issue Department

ASSETS	LIABILITIES
Net Foreign Assets [F]	Currency in circulation [C]
Cash in foreign currency	
Monetary gold	Bank deposits and current accounts [R] (+ **100**)
Foreign securities	Government deposits and accounts [G]
	Banking department deposit [B] (- **100**)

Balance sheet of Banking Department

ASSETS	LIABILITIES
Loans and advances to banks (+ **100**)	Borrowings from IMF
Receivables from Govern ment	Liabilities to other financial institutions
Bulgaria's IMF quota and holdings in other international financial institutions	Capital
Banking department deposit [B] (- **100**)	

We should also discuss the possibility of a temporary drift from the currency board rules. As the basic objective of second generation currency boards is monetary stabilization and in most of the cases these arrangements are put into practice after a period of hyperinflation or a financial crisis, any break of the currency board rules (reserve money backing and fixed exchange rate) will likely be considered as a return to financial instability or inflation (with respect to the theoretical models we reviewed in section 2 we might think of this to be the cause of a change in market expectations causing the economy to jump from a "good" equilibrium to a "bad" one). While the gold standard principle worked for quite a long period of time, was an international agreement

and surely had also educational purposes (for the monetary authorities and the public), currency boards typically have operating for considerably short periods of time[65] and are typically put into practice because of national instabilities. In addition to that only a few countries work with a currency board arrangement.

Altogether, the experience of the current currency boards shows that the LOLR-function is exercised only very rarely. For example, during the 5-year existence of Bulgaria's currency board, BNB did never made use of its LOLR function, although two banks suffered some liquidity difficulties. Both banks were considerably small and failed. In the beginning of 1999 Credit Bank was declared to be insolvent (BNB (1998)) and in the beginning of the following year Bulgarian Universal Bank went bankrupt (BNB (2000)). This experience shows that a restrictive definition of the LOLR-function might be sufficient to provide the necessary stability to the financial sector thereby preventing bank runs from occurring.

6. Summary and conclusions

The above expositions showed that Bulgaria's 1996/1997 Financial Crisis was primarily (but not only) due to heavy moral hazard behavior of the banking sector. Thus Bulgaria's crisis might serve as an outstanding example for a moral hazard driven crisis in the tradition of the Dooley (1997) and Krugman (1998) models. Different from the typical assumption of third generation currency crisis models the moral hazard behavior was (at least initially) not induced by explicit governmental guarantees but by the unchanged public belief that the government will care about industries and banks facing bankruptcy problems. These beliefs were reinforced by the government's effective behavior and resulted in systematic moral hazard behavior. When the public started to worry about the governments' ability and willingness to continue this policy a banking crisis was triggered which was reinforced by governmental bail-out guarantees. Both, theorist and practitioners seem to have underestimated the special moral hazard risk in transition countries.

The following conclusions might be drawn:

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[65] The oldest is the currency in Hong-Kong (since 1983) and even this arrangement can hardly be compared to the „century" of the gold standard (compare Caprio et al. (1996)).

- The twin crisis in Bulgaria of 1996/1997 underlines both the importance and the vulnerability of banking systems in transition countries. On the one hand a strong banking system is needed to provide financing of investments (since a capital market based financing is often impossible). On the other hand the process of transition needs time and holds the risk to be interrupted. The transformation process is often a time of soft budget constraints that might end up in a deep financial crisis, as the Bulgarian example showed.

- The sudden shift from an extremely loose to an extremely restrictive refinancing politics is likely to generate a currency crisis. If this restrictive policy is accompanied by a significant direct budget financing, the crisis is reinforced. The high interest rates put an excessive burden on internal debt servicing as well as on commercial banks.

(Not only) the Bulgarian experience showed that the set up a new institutional structure of the banking system and especially the role of the central bank might be useful to stabilize a crisis economy. Bulgaria decided to introduce a currency board arrangement. In fact, this is not the only possible solution but – at least up to now – a successful way to impose discipline into the banking system. To be less prone to future financial crises, Bulgaria introduced a second generation currency board that allows the central bank to act as a strictly limited lender of last resort.

In the light of the recent Argentine "Tango Crisis", culminating in the abandonment of the currency board on the USD in January 2002 the question arises whether the Bulgarian currency board system is still adequate. Or to put the question in a different way: what makes the Bulgarian situation different from the Argentine one? While it is not the subject of this study to compare the Argentine and the Bulgarian currency board at length we shall make a few remarks with respect to the above questions.

We suggest that the Bulgarian currency board arrangement is less prone to financial crises than the Argentine one because:

- the Bulgarian Currency Board is comparatively more orthodox than the former Argentine arrangement (full reserve money backing and strictly limited LOLR-function)[66]. On the one hand the strictly limited LOLR-function is reducing moral hazard behavior what was

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[66] See Schuler and Hanke (2001).

identified to be one of the major reasons for the Bulgarian Currency Crisis of 1996/1997. On the other hand and argued in line with the Diamond-Dybvig-model the limited LOLR-function might increase the risk of bank runs due to random withdrawals. This tradeoff is hardly to be discussed away but according to the specific Bulgarian experiences the restriction of the LOLR-role of BNB seems to be adequate. To minimize the risk of bank runs Bulgaria introduced a more efficient system of bank regulation and supervision than before the 1996/1997 financial crisis.

- Bulgaria did significantly better in deciding on its reserve currency as Argentina. Argentina chose to peg the Peso against USD although there are no significant exports to the United States of America. When the Real, the currency of Argentina's most important export region Brazil, started to devalue against USD in January 1999, the Argentine economy got more and more uncompetitive and dropped into a deep recession. While Bulgaria is surely not an important trade partner for the major EU member countries, more than 60 percent of Bulgaria's foreign trade is organized with EU members. That is why Bulgaria decided to choose Euro as anchor currency. Since even a second generation currency board only allows for a low degree of active monetary policy the question whether Bulgaria will be able to stick to its currency board arrangement will also depend on the question whether Bulgaria is hit by asymmetric shocks with respect to the EMU countries. In a recent empirical study Weimann (2001) showed, using an vector-autoregressive model, that the Bulgarian economy is positively correlated with the EMU member countries at least as far as output-persistent shocks are concerned. Thus, Bulgaria seems to be not a worse candidate for EMU-accession than the Czech Republic or Hungary.[67] Weimann (2001) also found Bulgaria not to be in a worse position than e.g. Greece or Portugal was in the eve of their EMU-accession. Altogether these findings also indicate that Bulgaria's decision to peg its currency board first to Deutsche Mark and later on to the Euro was surely better than to use the U.S. Dollar as reserve currency.

- Argentina's decision to introduce a currency board arrangement in 1989 was an attempt to end a long period of recession and hyperinflation. Even if the concrete situation of Argentina and Bulgaria can obviously not be compared, it has to be admitted that the

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[67] Compare also Brada and Kutan (2001) for similar analysis.

motive to introduce the Bulgarian Currency Board was quite similar. Nevertheless there is an important difference with respect to the time-horizon of the monetary strategies in both countries. Even if price stability was restored soon after the introduction of the Argentine Currency Board, Argentina did not consider to change its monetary strategy in the foreseeable future – maybe due to the fear, that hyperinflation could be back, soon. In contrast to that, Bulgaria is currently in the process of qualifying for EU- and EMU-accession (even if on a comparative early stage).[68] Thus, the currency board system is not more than a transitional episode – even if it is currently unclear when exactly Bulgaria might expect to be admitted to take part in EMU. To be able to qualify for EMU, what is expected by the government and the public to be advantageous for the country, Bulgaria has to follow a stable fiscal policy. In fact Bulgaria's fiscal discipline was quite high since the introduction of the currency board arrangement in early 1997. Furthermore, a recent study shows that the dangers of so-called Balassa-Samuelson effects on price dynamics in Bulgaria are largely exaggerated (Nenovsky and Dimitrova, 2002).

- Argentina's working class wields enormous power thereby preventing almost all attempts to make the labor market more flexible. Unions in Bulgaria are much weaker allowing for a much larger degree of labor market flexibility. Real wage flexibility is a major condition for absorbing shocks in an economy under a static central bank and a key element of automatic adjustment mechanisms of currency boards. Empirical estimations (Nenovsky and Koleva, 2001) show that the currency board in Bulgaria exerts pressure on labour market changes, particularly on its institutional structure. The index of real wage rigidity (Vinals and Jimeno's methodology)[69] in the state sector indicates a considerably increased flexibility after the introduction of the currency board. Nevertheless, real wages in Bulgaria are much more inelastic than in the EU and industrialised countries.

- more than half of Argentina's exports are food and farm commodities. The prices of these goods are heavily depressed by the subsidies in the United States and the EU. At the end of year 2000 consumer goods represented 29.9% of Bulgarian exports and food only 3.3% (BNB, 2000). The main export items are raw materials feedstocks (44.1%), energy

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[68] Compare Ialnazov and Nenovsky (2001) for this aspect.

[69] Vinals and Jimeno (1998).

commodities (14.6%) and investment goods (11.5%). In any case, Bulgaria as a candidate for EU-accession has some advantages in this respect resulting from association-agreements with EU. In addition to that Bulgaria profits from EU-subsidies which are intended to build up a healthy economy in Bulgaria before entering EU and EMU.[70]

- last but not least Bulgarian internal debt is at a comparatively low level and primarily BGN-denominated (different to Argentina where a significant part of the internal debt is USD-denominated.

Altogether, we therefore judge the Bulgarian Currency Board to be more stable than the Argentine one. However, no fixed exchange rate regime is immune to crises. Thus, our conclusions are statements on probabilities rather than on possibilities.

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[70] Compare also Reding (2002) for this aspect.

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