

A Selective Bail-Out International Lending of Last Resort Model*

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In the event of third generation crisis, international lending of last resort should be used if and only if the ILLOR is informed on the subject of financial and banking domestic markets. Therefore, it will act at a macroeconomic level, as a usual ILLOR, but also at a microeconomic level, since there will be selective lending to commercial banks. Our model shows that there are two conditions of optimality of this intervention: first, the country should be eligible; second, only solvent banks should be bailed out.

Key Words: Lender of last resort; Capital account crises; Systematic risk; Financial stability; Inter-Bank market.

JEL Classification Numbers: G21, C15, C81, E44, F33-34, N20.

1. INTRODUCTION

The current third generation crises are predominantly banking crises which may be accompanied by exchange crises (twin crises). Their recurrence has led us here to study the debate on loans of last resort (LOLR).

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Bail-out in the management of crises is a bone of contention insofar as moral hazard is concerned. It represents a solution if and only if the international lender of last resort (IOLR) possesses information as to the financial and domestic banking markets that are involved. This conception requires sharing the assignment of the IOLR between a microeconomic function of selective loans to individual banks, and a macroeconomic function ensuring an international liquidity level likely to respond to market failures.

Therefore, the functions of regulation, deposit insurance and IOLR need to be coordinated in order to reduce informational asymmetries (Kahn and Santos, 2001; Quintyn and Taylor, 2003; Corsetti and al, 2005). This is a condition for the mutually advantageous agreement of the actors (IOLR, central banks and secondary banks) to a prudential regulatory framework likely to prevent conflicts in a cooperative context.

In particular, the IOLR, in charge of solving market failures that may lead to runs, has to enable solvent banks to carry on with their activity and depositors to withdraw their deposits. In spite of the recent improvement in banking regulations and an increase in international liquidity (Laidler, 2004), it remains necessary to aid individual banks during crises because of the high volatility of international capital flows (Barth and al, 2002), which enhances the vulnerability of economies at the risk of runs. In this context, Jeanneau and Micu (2002) have shown that the Basel Agreements have had little effect on the quality and the destination of international bank loans, which emphasize the volatility and the risks because of a tendency to make short-term investments since the 90s. Meanwhile, credit activity greatly contributes to the increase in risks, as it considerably grows before the outbreak of crises (Martinez Peria and al, 2002). Therefore, Borio (2003) advocates to reinforce the macroprudential framework and to relate it to a microeconomic dimension, as later exposed by Just (2004).

Within this framework, this paper aims to specify a selective bail-out model, including the prevention and management of crises by the IOLR. Prevention amounts to containing risk-generating behaviour in order to limit the frequency of crises. Managing crises by the IOLR consists in avoiding their systemic propagation and in minimising their extent and cost by restoring the confidence of agents. With our model, it is possible to fulfil those two assignments to the extent that the decision of the loan of last resort depends on a rating that is associated to each domestic financing system. Consequently, the eligibility to loans is similar to a sign of repute from borrowers (countries and secondary banks) prone to condition the behaviour of agents towards bigger stability.

Section 2 will show, with a survey, that the efficiency of the institutional regulation of the IOLR requires trustworthy information on the quality of domestic financial systems constituent of the rating. The progressivity

of intervention thresholds together with regular reviews of these ratings consequently enables us to combine the principle of a selective bail-out with that of constructive ambiguity in order to stem the moral hazard risk. On this basis, in the model (section 3), the optimality of the ILOLR's institutional regulation depends on the existence of two levels of selective bail-out: the "country level", and the "secondary banks" level.

2. SURVEY

Since the early eighties, the upholders of institutional regulation have contended that in a context of financial globalisation, the ILOLR has to be a supranational institution endowed with a global macroeconomic view of international interdependencies (Humphrey and Keleher, 1984). In this sense, Goodhart (1999) shows that the social cost of systemic crises together with the system risk is superior to negative externality in terms of moral hazard as to the bail-out (Goodhart and Huang, 1999, 2000). This argument has been taken up again by Fischer (1999), Eichengreen and Ruhl (2000) or Spiegel (2001), but disputed by Bordo (1990) and Bordo and Schwartz (2002).

This argument of an irreducible moral hazard has been systematized by the upholders of free market (Schwartz, 1998; Calomiris, 1998; Meltzer and al, 2000), who advocate renouncing the management of crises by the ILOLR. This viewpoint was resumed by White (2000) for whom no sort of financial instability whatsoever, be it international contagion, can justify an international super-regulator.

The common denominator to these two Schools lies with moral hazard. Indeed, as soon as the ILOLR provides a collective insurance against systemic risks, the moral hazard becomes a constituent feature of its existence. Hence, an ambiguity as its action is both a violation of the functioning of markets and a condition to their durability.

This risk can be assessed empirically. Thus, Haldane and Scheibe (2004) have drawn attention to the existence of a moral hazard to IMF loans to emerging countries, over the period [1992-2002], which lowers the probabilities of sovereign default of these economies. Hence a distortion of the assessment of banking markets in these countries, which spurs them to take further risks. The systematization of this argument (Goldfajn and Valdès, 1999) shows that a complete financial rescue toughens the behaviour in terms of exposure to risks, and thus leads to an increase in the probability of runs. These upsurges in systemic risk can be curbed by limiting the risk of contagion by taking into account, when granting ILOLRs, the intensity of banking and commercial relations between recipient countries and vulnerable economies (Copelovitch, 2003), or even the presence of multinational banks (Calzolari and Loranth, 2005). In Naqvi's model (2004),

followed by Kim (2004), it is the informational non-fulfilment that explains this “deviant” behaviour and therefore the increased moral hazard. However, in the case of self-generating financial panics, Sachs (1997) or Radelet and Sachs (1998) relativize this externality by highlighting that the intervention of the LOLR thwarts the gregariousness of behaviour, which is a condition for bail-in.

Once the moral hazard has been assessed, the question under debate is that of the means to stem it. Thus, Niskanen (2004) has shown that a global regulation framework composed of a deposit insurance, of a compulsory capital ratio and of prudential monitoring is disincentive to cautiousness. Therefore, he proposes a system of market discipline which produces incentives favouring behaviour that facilitates financial stability, focusing on a LOLR whose efficiency depends on its capacity to provide liquidities according to the risk profile of the bank, which is a key argument in our selectivity model. This argument is used in the modeling of the interbank market by Freixas and al (2003), for the results of the LOLR depend on the nature of the moral hazard. If it stems from a lack of incentives for banks to select the loans, the LOLR has to intervene so as to reduce the failures to coordinate and to improve the efficiency of a non-secured interbank market. Conversely, if the main source of moral hazard lies with monitoring the loans on a secure interbank market, then the LOLR can not be justified.

Cull and al (2004) empirically confirm the existence of a moral risk linked to the deposit insurance, in particular in countries where the rules are not properly established (or respected) and where central banks are not independent. The deposit institutions then pursue high-risk activities that may destabilize banking intermediation in the long run. This illustrates the possibility for high-risk behaviour to occur, even outside LOLR, enhanced by interbank competition (Hellmann and al, 2000; Repullo, 2002).

These controversies show the need to take into account, in order to conceive an international financial architecture, both domestic features and a definition of universal rules (Gorton and Huang, 2002; Fecht and Tyrell, 2004). The LOLR can improve or deteriorate well-being according to whether the banks or the market predominate and according to the liquidity ratio of assets. Hence, crisis management policies require to be directed towards a discretionary approach.

The argument based on well-being, where the stability of financial systems is conceived as public property, is akin to Jeanne’s analysis (2001) where the effects of LOLR on social welfare depend on its ability, during crises, to coordinate creditors according to debt maturity and to impose a tax on short-term capital flows, or even to internalize the risky behaviour of private agents (Lerrick and Meltzer, 2002; Corsetti and al, 2005). In this sense, Jeanne and Wyplosz (2002) envisage two types of international

financial architecture. The first one favours a universal dimension, and the ILOLR's main assignment is to pour liquidities into financial markets, which implies an international currency. The second one emphasizes regional specificities, and the ILOLR's bail-out focuses on the support of banking safety nets, which requires an international banking fund involved in supervising domestic banking systems. The selectivity model enables us to reconcile these two conceptions.

3. THE MODEL

When a crisis occurs, the selectivity principle implies the assessment of the eligibility (or not) of the relevant countries (3.1.), so as to bail out only the solvent but illiquid banks of the recipient country (3.2.).

3.1. The macroeconomic level

Further to Elsinger and al (2005), we discriminate applicant countries to the ILOLR by rating their domestic financial system based on a balance sheet analysis of all the local banks according to their ability to settle their debts on the interbank market with a of logic referring to "contagious default" (i.e. illiquidity in the sense of Bagehot) vs "fundamental default" (i.e. insolvency in the sense of Bagehot).

Let a "world economy" be characterized by a set $N = \{1, \dots, N\}$ of emerging countries and an ILOLR have an amount (Z) of liquidities at its disposal so as to pay a possible $LOLR(X)$.

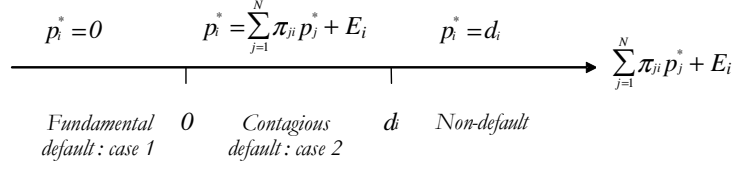
Each country (i) has a banking system characterized by a given value (E_i) of its initial net position (whether debit or credit) and by its debt (l_i) towards the other countries ($j \in N$). This "world economy" thus features a matrix (L) having a dimension ($N \times N$) and a vector (E), and we note this system as (L, E) .

If the value (L_i, E_i) of a country (i), $\forall i$, is negative, it is in a position of "default" which should be qualified as "contagious" or "fundamental". To do so, we will call (d) the vector of total debts of countries towards the rest of the system, as $d_i = \sum_{j \in N} l_{ij}$, with d = the debt of country (i) towards all the other ones.

We will define a new matrix Π derived from $L(\Pi \in [0, 1]^{N \times N})$, qualifying what a country owes to each other country related to its total debt, that is to say:

$$\pi_{ij} = \begin{cases} l_{ij}/d_i & \text{si } d_i > 0 \\ 0 & \text{si } d_i \leq 0 \end{cases} \quad (1)$$

For each set (Π, E, d) , there is a (unique) vector of payments (p^*) standing for the actual reimbursement of each country during period (t), taking into account the risk of non-repayment that each debtor country represents.

FIG. 1. First level of bail-out selectivity


Country (i) , $\forall i$, is in default when $(p_i^* < d_i)$:

$$p_i^* = \begin{cases} d_i & \text{if } d_i \leq \sum_{j=1}^N \pi_{ji} p_j^* + E_i \\ \sum_{j=1}^N \pi_{ji} p_j^* + E_i & \text{if } 0 \leq \sum_{j=1}^N \pi_{ji} p_j^* + E_i \leq d_i \\ 0 & \text{if } \sum_{j=1}^N \pi_{ji} p_j^* + E_i \leq 0 \end{cases} \quad (2)$$

Which can be summarized as follows:

$$p^* = \min[d, \max(\Pi' p^* + E; 0)] \quad (3)$$

i.e. a country will reimburse a minima $(\Pi' p^* + E)$, this value may be zero and will not exceed the amount of its debt (d) .

Consequently, country $(i) \forall i$ is in “default” if $p^* < d_i$; with two cases of eligibility vs. ineligibility to the ILOLR, which comes down to the first level of bail-out selectivity:

case 1 : $\sum_{j=1}^N \pi_{ji} d_j + E_i - d_i < 0$, country (i) is in “fundamental” default, for its debts on the interbank market are inferior to its contracted debts (d_i) , considering the value of (E_i) , which corresponds to a situation of insolvency, making it ineligible to the ILOLR, that is to say $(X = 0)$.

case 2 : $\sum_{j=1}^N \pi_{ji} d_j + E_i - d_i \geq 0$ and $\sum_{j=1}^N \pi_{ji} p_j^* + E_i - d_i < 0$, country (i) is solvent considering its balance sheet (domestic debt inferior to domestic claims in view of (E_i)), but the default of at least one of its debtors (j) , $\forall j$, causes it to be defaulting on the interbank market, i.e. in a position of illiquidity, or a configuration of “contagious default”. In this case, the ILOLR has to intervene so as to stem the contagion, i.e. $(X \leq Z)$.

According to these two cases, only part $\{1, \dots, m\}$ of the N emerging countries is eligible to the ILOLR. The other countries $\{m + 1, \dots, N\}$ should not be aided so as to incite them to improve their functioning, in particular the ability of their banking system to reimburse their international debt.

3.2. The microeconomic level

Let a country (i) be in a situation of contagious default (case 2: $i \in [0, \dots, m]$): the banking system of (i) is solvent and benefits by a bail-out

from the ILOLR. In order to stem the moral risk, “Bagehot’s rule” teaches us only to bail out the solvent but illiquid banks of this country¹.

The central bank of country (i), eligible to the ILOLR, then receives an amount (X) of liquidity ($0 < X < Z$), which it uses for two purposes, i.e. $X = \{X_1, X_2\}$:

— it rebuilds its monetary reserves, in a concern of credibility, for an amount (X_1);

— it only bails out establishments favourably assessed according to the ILOLR rating, i.e. solvent but illiquid banks, for an amount (X_2).

The moral hazard is stemmed in compliance with the constructive ambiguity principle (Goodhart and Huang, 1999) applied to the computations of the rating and the intervention threshold of the ILOLR, but also to the amount of the bail-out. The government knows Z but not X , and individual establishments do not know X_2 . Agents are urged to be cautious, that is to say to implement macro- and microprudential reforms.

Coefficient μ reflects part X_2 of funds meant to bail out a constituent establishment of (i)’s banking system. According to the rating, we can identify the balance risks of banks in view of their portfolio in country (i) confronted with a liquidity shock. Further to Corsetti and al (2005), two types of investment are possible:

— in international available assets (M) “remunerated” at the safe interest rate $r^* = 0$;

— in risk-involving domestic assets (I) which eventually (t_2) provides, a positive yield R (with $ER > 1 + r^*$), but whose premature closure (t_1) entails liquidation costs (κ) according to the type of domestic investment : either a productive investment (I_1) with a yield (R_1) and a cost (κ_1), or a speculative investment (I_2) with a yield (R_2) and a cost (κ_2); with ($R_2 > R_1$) and ($\kappa_2 > \kappa_1$).

Each bank thus possesses a balance-sheet as follows:

Banks make investments (M, I_1, I_2) depending on their grants (e) and their loans (D) in accordance with two types of portfolio:

— Banks A choose a cautious behaviour, i.e. positioning on international liquid assets (M). Consequently, they are eligible ($0 < \mu \leq 1$).

— Banks B resort to high-risk domestic assets (I). A priori, they are not eligible ($\mu = 0$).

The model goes through three stages:

¹At the first level of selection, the ILOLR was compelled to reactualize Bagehot’s distinction between insolvency and illiquidity of countries because of the contagion mechanism that caused illiquidity situations to degenerate into insolvency situations. At the second level, the difficulty remains but can be solved with the help of research on modeling the forecast of banking default : for instance, the CAMELS rating (composed of a set of indicators gathered as follows : C = capital adequacy ; A = asset quality ; M = management quality E = earnings ; L = liquidity ; S = sensitivity to market risk) is an efficient tool to assess a bank’s solvency by means of the management of its activity.

TABLE 1.

Balance sheet of a domestic commercial bank			
Assets		Liabilities	
Reserves	e	Short-term loans	D
International liquid assets	M	ILOLR	μX_2
High-risk domestic assets	I		
— productive (I_1)			
— speculative (I_2)			

t_0 : In compliance with constructive ambiguity, the government knows Z but not X , and individual establishments know neither X_2 nor μ .

Let there be a liquidity shock: an important fraction (x) of creditors do not renew their loans. In this case, each bank needs liquidity (xD), hence a situation of illiquidity for all banks ($A + B$) and a risk of insolvency for banks (B):

— Banks A are eligible in view of their prior portfolio choices: secure international liquidity investments (M) ensure their eligibility to the ILOLR, i.e. $M + e + \mu X_2 \geq xD$.

— Banks B have invested in high-risk domestic projects (I) and support from the ILOLR depends on their ability to restore their solvency in (t_1). Hence, we need to distinguish two categories of risks B_1 and B_2 according to their investments in (I_1) and (I_2).

t_1 : In order to meet the need for short-term liquidity (xD), banks B have to liquidate all or part ($z \leq 1$) of their investment (I), with split liquidation costs (κ) according to the respective nature of (I_1) and (I_2).

Generally, the solvency condition for banks B is the following: $\frac{zRI}{1+\kappa} + e \geq xD$.

More specifically, two cases occur depending on the contents of (I):

— Banks B_1 are oriented towards productive investments and can liquidate their investment at little cost (κ_1), which enables them to reimburse their international debt: $\frac{zR_1I_1}{1+\kappa_1} + e \geq xD$, i.e. restoring their solvency in (t_1), although these banks require bail-out in order to stem their illiquidity.

— Banks B_2 bear high liquidation costs (κ_2), confirming their insolvency. Even by carrying out the whole of their portfolio of assets ($z = 1$), we get: $\frac{R_2I_2}{1+\kappa_2} + e < xD$, which makes them definitely not eligible to the ILOLR.

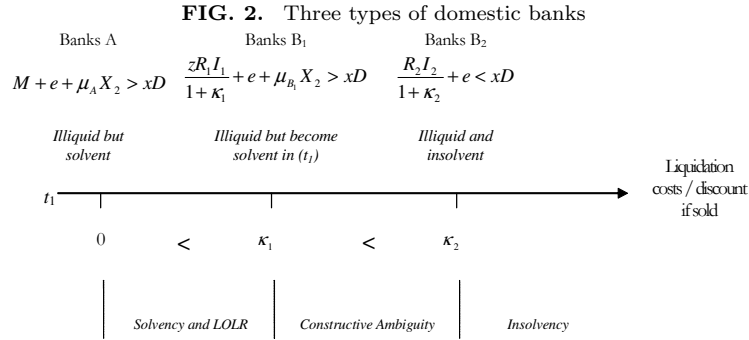
t_2 : The ILOLR, via the central bank, bails out eligible banks (A) and banks whose solvency has been restored in t_1 (B_1) by means of distress sales facilitated by possessing assets that can be priced even in emergencies (I_1), i.e.:

— eligible banks A are bailed out ($\mu_A X_2 > 0$);

— banks B_1 that have become solvent also benefit by a bail-out ($\mu_{B_1} X_2 > 0$);

— banks B_2 that are definitively insolvent are excluded from the rescue process ($\mu_{B_2} = 0$); with $\mu_A X_2 + \mu_{B_1} X_2 \leq X_2 \leq (X - X_1)$.

In other words, if a crisis occurs, the content of the portfolio of banks influences possible liquidation costs, which determine the bank’s solvency vs. insolvency in (t_1) , i.e.:



4. CONCLUSIONS

The selectivity model distinguishes itself from interbank debt or contagion models by relating bail in and bail out, thus emphasizing the need to coordinate all the agents, whether public or private, facing the market failures that characterize the current international financing system. Three main conclusions can be drawn from this model.

Firstly, it legitimates the action of the ILOLR both at the macroeconomic (the bail-out of countries) and the microeconomic (from the point of view of banks) level, if the eligibility to the LOLR comes within a logic of rating.

Next, by extension, it provides a dynamic combination of bail-in and bail-out: the withdrawal of capital (xD) has to decrease over time for the countries and banks that have been favourably rated. The rating therefore partakes of the reduction of asymmetric information on financial — notably banking — markets, thus stabilizing behaviour by facilitating the choice of investments for international operators.

Lastly, by its construction, this model is likely to account for the difference between emerging countries, legitimating the discretionary approach of the ILOLR between:

— emerging countries endowed with an important financial structure, where banks are essentially oriented towards finance and are de facto highly vulnerable to external shocks ($\frac{B_2}{B} \rightarrow 1$);

— the “NIC”, that is the emerging countries integrated into global finance with a view to improving the real growth of the economy, where banks had better implement the same rigour ($\frac{B_1}{B} \rightarrow 1$).

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