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1. Introduction

The interventions of Central Banks to avert the failure of financial institutions and to guarantee the stability of the financial system have multiplied in the last decade. Public opinion has been shocked by cases such as the rescue of the American savings and loan industry, Banesto, Crédit Lyonnais, Long Term Bank of Japan, and Long Term Capital Management or the interventions that affected whole economies in South-East Asia, Russia or Brazil.

These interventions became critical in the '98 crisis and made evident at least three characteristics of interventions by the lender of last resort. First, the incapability of central banks in emerging countries like Thailand, Malaysia, Korea and Russia to cope with a widespread financial crisis. Second, the close connection manifested in these countries between a banking crisis, a financial crisis and a real sector crisis. Finally, the need for adequate institutions to confront possible crises, in a context in which the IMF and G-10 have both shown a lack of coordination and efficiency.

The existence of a lender of last resort is justified by the possibility of a systemic financial crisis, defined as a crisis in which the usual mechanisms and financial channels stop exercising their functions, thus interrupting the development of commercial transactions. Given the catastrophic dimensions of systemic crises, there is a broad consensus on the need to design the necessary mechanisms to prevent such events, with the intervention of the lender of last resort at the **macroeconomic** level, providing liquidity to institutions when the market fails to do so. It is for this reason that since the middle of the 19th century the vast majority of developed economies have established a Central Bank responsible for the management of liquidity in financial markets. The creation of Central Banks has had a large positive effect on economic activity, dampening the severity of crises and economic cycles (Miron, 1986).

Nevertheless, at the **microeconomic** level there is an intense debate over the functions that the lender of last resort should carry out in practice and the intervention methods it should use. Also contested is the role that the lender of last resort should have in the international arena, an issue that has recently received a lot of attention.

Our goal in the present article is to analyze the present state of the controversy over the intervention of the lender of last resort, comparing the main ideas provided by economic theory with the intervention policies that are actually carried out in practice. We will first discuss the motivation for having a lender of last resort. After discussing different justifications for the existence of a lender of last resort, we will examine which types of intervention they imply, before analyzing the specific implications for intervention at the international level.

2. The justification of the role of the lender of last resort: theoretical foundations

Economic theory tells us that the existence of a “visible hand” that substitutes or complements market mechanisms is only justified by the presence of a market failure. Two types of market failures are characteristic to the banking sector: the possibility of a liquidity crisis, and the external effects generated by the failure of a financial institution. The importance of these market failures depends on the economic and financial environment. Thus it is important to consider first the role of the lender of last resort in today’s financial environment, before analyzing the type of institutions that are justified from a theoretical point of view.

2.1 Liquidity crisis

Because of the nature of their business, banks accept a liquidity risk by financing their long-term loans with short-term deposits. Therefore a liquidity crisis can arise when depositors decide to withdraw their deposits, thus triggering a bank run. In the absence of an institutional mechanism that corrects it, this behaviour becomes a self-fulfilled prophecy, since, given the banking crisis that ensues, it is rational for depositors to liquidate their deposits. In economic theory a liquidity crisis is modeled as a game with multiple equilibria, with one of them being superior to the others (Diamond and Dybvig, 1983).

From a historical perspective, liquidity crises were pervasive before central banks were established. Since then, and thanks to the creation of central banks, this type of crisis has lost some importance.

2.2 Systemic risk and contagion

The second market failure that justifies the existence of a lender of last resort is the importance of the external effects generated by a bank failure. The failure of financial institutions, and especially the failure of depository ones, greatly exacerbates the importance of these external effects due to the possibility of contagion. Contagion can arise from a change in agents' expectations about the soundness of the financial system, or it may arise from the creditor and debtor positions that financial institutions have with one another.

Contagion through expectations

A bank failure can affect the behaviour of depositors in other banks, with the risk of a widespread crisis. Two mechanisms can spread the failure of one bank into others: pure speculation and the similarity of their assets.

- The purely speculative contagion occurs when the failure of bank A leads to a change in the behaviour of depositors in bank B, creating a withdrawal rush and a crisis in bank B.

- The second type of contagion arises because of the similarity of banks' asset portfolios. The failure of one bank may come from a low profitability of its investments, which affects all banks with similar investments (in the same sector or in the same country). Investors will liquidate their deposits to protect themselves from potential risk, leading to widespread failures of all those banks with similar investments.

The difference between the two types of contagion is important, since in the first case

contagion leads to the liquidation of solvent banks while in the second the crisis affects banks in a precarious situation due to the low profitability of their investments.

The bank system as a network

Because of the role of banks as providers of transaction services, which some authors consider the principal feature of banks (Fama, 1970; Gurley and Shaw, 1960), the banking system is a network that allows the transfer of property rights. Efficient working of this network requires that some institutions be creditors to others, which leads to a credit risk between institutions, with a real contagion effect: the bankruptcy of one bank hurts all its creditors. To be precise, the contagion through this interdependent structure comes from three sorts of operations:

- **Compensation risk.** To ease transactions between banks, it may be efficient to use a compensation and liquidation system, which means that there exists a credit risk between institutions. Even though positions are closed each day, the volume of these transactions is of such magnitude that these risks cannot be ignored (see Humphrey, 1986).

- **Interbank market.** A second source of credit risk comes from the operations of loans without guarantees between financial institutions.

- **OTC derivatives.** Banks may also face credit risk that comes from their off-balance sheet operations in over-the-counter (OTC) markets, whenever the evolution of the underlying asset turns the bankrupt institution into debtor of other institutions.

2.3 Today's financial environment

Some of the changes that the financial sector has experienced in these last years have contributed to reduce the externalities that justified the existence of the lender of last resort. These changes can be technological; they can affect the liquidity of markets, and/or the behaviour of depositors. Nevertheless, the financial environment has also changed towards a greater internationalization of financial markets, which in turn implies a larger risk of international contagion.

Technological changes

The technological progress in information transmission has led to the development of a liquid market for repurchase agreements (repos) that institutions use to manage their liquidity without credit risk of any kind. Furthermore, innovations in the speed of information transmission has allowed the development of real-time interbank liquidation systems, to the detriment of the classic systems of compensation and liquidation that entailed a larger interbank risk. Both innovations have thus greatly reduced the risk of contagion.

The greater liquidity of markets

The development of financial markets and their regulation has led to lower transaction costs. It is easier for institutions to obtain liquidity by selling securities in a variety of markets. Liquidity risk is thus lower nowadays.

The change in the behaviour of depositors

Nowadays, thanks to a financial regulation that protects better the small investor, in particular,

thanks to the generalization of deposit insurance and the direct intervention of the lender of last resort, systemic risk is lower. This comes from the disappearance of purely speculative crises, in which depositors demanded the conversion of their deposits into cash. With the exception of emerging countries, in which a financial crisis can lead to an abandonment of the local currency in favour of a stronger currency, the liquidation of deposits in one bank leads usually to the opening of deposits in another financial institution.

The larger international interdependence

Another characteristic of the new financial environment is the globalization of the banking business. There is a greater presence of foreign banks in the form of branches or subsidiaries. Furthermore, there is a greater development of the international interbank market.

The greater presence of foreign banks implies that if an institution goes bankrupt, it is more difficult for the banks of a financial centre to be able to organize its rescue if this operation is not directly profitable, since the operation is against shareholder interests. This fact could explain why so many recent bail-out operations of troubled financial institutions have been made with public money, directly or indirectly (with central bank funds).

To summarize, the changes in the financial environment have led to a smaller risk of contagion, while simultaneously the risk of international contagion has increased.

2.4 Implications for institutional design

When we consider the intervention of the lender of last resort using a theoretical approach,

the implications for the institutional design appear more clearly, being able to differentiate between the roles of the lender of last resort and those of the central bank.

To prevent or to heal?

Since the intervention of the lender of last resort is justified by the externality created by the failure of a financial institution, an efficient resource allocation entails a limitation of this externality, that is, a limitation of contagion. Taking this into account, one must emphasize that regulation has not insisted enough in the creation of mechanisms that limit contagion between financial institutions, although these mechanisms are already available. For instance, the repos market allows for liquidity management and real time transactions spare the payment system the implicit credit risk.

Crisis manager or resource provider?

Analyzing the actions of the lender of last resort, Fischer (1998) identifies two different functions. On the one hand, the lender of last resort acts as a manager of the crisis, coordinating investors and avoiding panics; on the other it is also its responsibility to create the liquidity that the market needs. The implication of this differentiation is important since these two functions could be carried out by different institutions. In fact, in some cases the lender of last resort has acted only as a crisis manager. Examples of this are the reaction to the 1987 stock market crash or, more recently, the response to the near-collapse of LTCM. In both cases the Fed or the New York Fed helped to coordinate the participants and made it clear that they would inject sufficient liquidity so that agents would not be forced to liquidate their

positions. Simultaneously, the possibility of a liquidity crisis justifies the role of the lender of last resort as liquidity provider.

3. Types of intervention

As a starting point and as a crucial benchmark we discuss Bagehot's basic principles and evaluate them in today's financial environment. This will allow us to consider the different reasons that have been given to justify the intervention of the lender of last resort, usually using Bagehot's authority to back them up.

3.1 Bagehot's classic contribution

Bagehot's contribution can be summarized in four basic points:

- Only sound financial institutions should have access to credit from the lender of last resort.
- Loans should be made at a penalty rate.
- Any financial institution should be able to secure a loan if it can provide sufficient collateral.
- The lender of last resort should publicly state its policy.

The existence of a penalty shows Bagehot's point that the market has to be the basic resort, and only when this fails should banks have access to the lender of last resort.

In a liquid market the first three principles would contradict themselves, since the private sector would be willing to lend against collateral with a lower penalty. Only in an illiquid market can the lender of last resort intervene and only

through open market operations. The fourth principle shows the coherence of the role of the lender of last resort: since it must limit its interventions to liquidity crises, the public announcement of its credit policy can only do good to the proper working of the market. Still, this principle has never been used in practice, since central banks have always preferred the pursuit of a “creative ambiguity” policy, term used to describe central banks’ capability of intervening at discretion.

3.2 The free-market view

Some authors, most prominently Humphrey (1986), consider that, in today’s financial environment where we can find a liquid market for repos, Bagehot’s principles imply that the lender of last resort should limit its interventions to the injection of liquidity through open market operations. Only in extreme cases of serious systemic risk should the central bank be allowed to intervene through loans to individual financial institutions (Schwartz, 1995). If a solvent but illiquid institution did not have assets that allowed it to obtain liquidity in the repos market, it could still get loans without guarantee from other institutions that would first analyze the solvency of the loan requester. The argument they use is based upon 1) the proposed mechanism is sufficient to solve all liquidity problems any institution might face and 2) that any deviation from these rules would lead to a lower market discipline, thus promoting larger risk-taking by the managers of financial institutions.

The implicit hypotheses that the supporters of this stand use are: 1) that the interbank market works, and 2) that the bail-out of a troubled financial institution has a high cost, in terms of the direct cost to taxpayers¹ and in terms of

diminished market discipline on the future behaviour of institutions.

3.3 The interventionists’ view

In direct opposition to the liberals, the “interventionists” propose to intervene whenever the cost of liquidating an institution is larger than the cost of keeping it in business. In our opinion it is incorrect to ground this position on the need to avoid the liquidation of solvent but illiquid institutions. As Goodhart (1988) has pointed out, in practice such a distinction is a utopia, since the central bank cannot distinguish between solvent and insolvent institutions. In addition, the supervising authorities keep some institutions afloat only because the externalities associated with their collapse are far too large, which is particularly true for too-big-to-fail institutions.

3.4 Recent contributions

The debate between liberals and interventionists leaves aside some of the issues discussed in lender of last resort economic models. From a theoretical point of view, it is not clear which is the market failure the intervention of the lender of last resort tries to fix. Also, from an applied point of view, one cannot understand why is it that central banks have systematically adopted an active policy and rescued troubled financial institutions². This fact has led to the development of new models that incorporate market failures in the interbank market. Recent contributions by Flannery (1996) and Freixas, Parigi and Rochet (1999) establish that multiple equilibria may arise in an interbank market. In such conditions the liberal argument is weakened since the implicit assumption of efficiency in the interbank market is no longer a natural hypothesis.

In Freixas, Parigi and Rochet (1999), we explicitly consider the role of the interbank system in an economy in which consumers want to consume in a different geographic area. They can decide to transfer their deposits to a bank located in that area or liquidate the deposits to have cash at their disposal. This model of consumer behaviour, close to the one used by Diamond and Dybvig (1983) in their seminal article, allows us to motivate the existence of an interbank market.

In Freixas, Parigi and Rochet, the interbank market allows banks to transfer liquidity between themselves, and thus saves the cost of liquidating illiquid assets. The original contribution is a complete analysis of the implications that the existence of an interbank market has from the interconnections between different depository institutions it creates. The analysis of these intertwined contractual relationships lead the authors to conclude that the lender of last resort has an essential role in the proper working of the interbank market at three different levels:

- In the first place, the lender of last resort needs to coordinate the participants of the interbank market. This is necessary due to the presence of two types of equilibria: one in which the interbank market works efficiently and a second one in which each depositor prefers to liquidate its deposits rather than transfer them to another bank, forcing institutions to liquidate their assets. This second situation constitutes an equilibrium since the liquidation of assets by institutions reduces the profitability of transferring the funds to another institution, thus making it optimal for depositors to liquidate their deposits.

- The existence of a multilateral system of interbank contracts has a second consequence, since the insolvent institution can skip market

discipline if it can secure a loan in the interbank market. Thus bank monitoring must reinforce the missing market discipline.

- Finally, if an institution is to be liquidated, a model of the interbank connections allows us to identify the possibility of contagion to other institutions. In this case it is the responsibility of the lender of last resort to limit the consequences that the closure of an institution may have to other institutions. Providing credit to those institutions whose liquidity has been hit, thus cutting the contagion mechanism between institutions, can do this. Still, if the complexity of the interrelations with other financial institutions is too large, the only way out of the crisis might be the rescue of the insolvent institution. This situation tends to occur when large institutions (too big to fail) get into trouble.

4. The lender of last resort at the international level

4.1 Characteristics of international crises

The national/international transposition

When considering the role of the lender of last resort at the international level, it seems difficult a priori to find many similarities with the responsibilities of its national counterpart. Effectively, the former lends to countries while the latter lends to financial institutions. Still, the problems faced by the lender of last resort at the international level are similar to those that the lender of last resort faces at the national level. This parallelism comes from the fact that it is easy to assimilate many of the conditions encountered by the lender of last resort at the international

level with those previously discussed (national level):

- The market failure is also due to the possibility of contagion, this time between countries.
- There are two types of intervention: intervention at the aggregate level and lending to some particular country.
- There is a difficulty in distinguishing between illiquid countries and insolvent ones.
- Just like commercial banks at the national level, the liability structure of emerging countries combines long-term assets with short-term liabilities.

Simultaneously there are important differences, the most important of them being the existence of a domestic currency which in a crisis will come under speculative attack. Also, the coexistence of a national supervising authority and a foreign or supranational authority, with the capacity to create liquidity in hard currency, is characteristic of the international level. These differences become critical when considering emerging economies for two reasons: first, domestic central banks have a much smaller steering capacity since a financial crisis can turn into a currency crisis with huge capital out-flows. Second, the lender of last resort at the international level (i.e., the IMF, the G10 or the US Treasury) does not constitute nowadays an institution with clearly defined goals and intervention capabilities.

Economic and financial features of recent crises

During this last decade the vast majority of emerging economies had their currencies pegged

to the US dollar, allowing them to reduce internal inflation. Still the change in the dollar/yen parity, and the subsequent deterioration of many emerging economies weighted-average exchange rate, implied a serious loss of competitiveness in international markets³. This phenomenon was in some cases reinforced by a higher domestic inflation than in the US.

As a result of their peg with the dollar, emerging countries hit by the crisis, especially in South-East Asia, saw how their balance of payments progressively deteriorated. To finance the subsequent deficits, these countries obtained financing in the international interbank market with loans denominated in US dollars, which had a maturity of less than one year⁴. The fragility of this financial structure facilitated a bank panic when the country risk increased, since foreign banks did not renew all those loans that reached maturity. The domestic banking system that issued long-term loans in domestic currency and financed them with short-term credit denominated in dollars had no instruments to face the risk. The collapse of the credit led the whole bank system to a bankruptcy situation.

International contagion

International contagion occurred at two different levels: at the financial and at the real level. At the financial level there is a one-to-one parallelism between the mechanisms that operate within a country and internationally. Contagion occurred when foreign banks revised their country risk and required higher margins and lower terms for loans to countries that were in a similar position. At the real level the financial crisis led to a fall in GDP, with the subsequent decrease in imports which affected the level of activity in exporting countries. More importantly,

the crisis led to a devaluation, which triggered a balance of payments' deterioration in countries that exported similar goods⁵.

4.2 The debate over the role of the lender of last resort at the international level

Liberals contend that the origin of the Asian crisis can be found in the implicit guarantees that investors thought they had. It is thus argued that it was the conjunction of high profitability and limited risk due to the likely intervention of the lender of last resort that led to over-investment into emerging economies. The implication is thus that the role of the lender of last resort should have been limited (for instance, during the crisis of Mexico) to avoid the creation of false expectations.

Interventionists consider, however, that emerging countries suffered a liquidity crisis when their long-term investments did not allow them to confront their short-term liabilities. Thus, it is said, the intervention of the lender of last resort was necessary and its cost small. Still, as is true at the national level, the international lender of last resort will have to be able to tell apart the solvent but illiquid countries from the truly insolvent ones. Again we think this distinction is not possible.

Just like it happens at the national level, the intervention of the lender of last resort can have an impact on the behaviour of economic agents, with the effect of becoming less efficient due to a moral hazard problem. For debtor countries the possible intervention of the lender of last resort may lead to less discipline in monetary and fiscal policies. For investors, the possible support of the lender of last resort diminishes their incentives to correctly evaluate the country risk if they know that in case of trouble the lender of last resort

will rescue them. Calomiris (1999) adds that there is a real cost to the interventions of the IMF since these interventions transfer the cost of the crisis from the international investors to the taxpayers of the troubled country, with the subsequent social cost. Nevertheless, as Brealey (1998) points out, in the last crises both the debtor countries and the investors have been severely penalized by the market. From this point of view the importance of the moral hazard argument has been overplayed in the analysis of the crisis.

4.3 The lender of last resort in the construction of Monetary Europe

The matter of the lender of last resort is a major concern in the construction of Monetary Europe. In spite of the existence of bail-out mechanisms to rescue distressed financial institutions in each country, the existing institutions do not allow for coordinate responses from different countries or a fast and efficient coordination between the European Central Bank (ECB) and the different national central banks.

Under the European monetary integration national central banks retain the supervising role and the responsibility of rescuing distressed financial institutions. The conditions under which the ECB can intervene in the rescue of an institution are extremely restrictive. This is why Pratti and Schinasi (1999) conclude "there is no pre-established mechanism which the ECB could use to offer liquidity in a fast and unilateral way to a financial institution with an asset liquidity problem"(p. 27). In the short run, since banks will not have diversified their investments, they will remain national, and the absence of a rescue option at a European level does not compromise Europe's financial stability. Nevertheless, in the longer run, the merge and acquisitions process

will lead to intra-European diversification. This may imply that the central bank of the country of origin may be forced to liquidate an institution whose bail-out cost is excessive, especially when only a fraction of the benefits that come with the rescue revert to the country of origin. Thus, the creation of the European Monetary Union will lead to stricter rescue policies for financial institutions. If we consider an institution whose failure has no important consequences, such change should most probably be welcomed; nevertheless, if we consider institutions whose failure may lead to systemic risk, these stricter policies may have consequences for the stability of the European banking system. This constitutes a true Damocles' sword⁶. If on top of this we add, as Pratti and Schinasi do, the fact that the structural changes needed to create the Euro zone are natural carriers of systemic risk, the need for the establishment of coordination mechanisms at the European level is even more urgent.

To this first criticism of the current state of bank supervision in Europe one must add another one: even though national central banks continue to act as lenders of last resort, their inability to create money will limit their possibility for action. Thus, when dealing with large sums, the bail-out of an institution will require ECB funds, which ultimately means that the European Central Bank itself will have to supervise European financial institutions. This supervision is still far from being implemented, and, in addition, the conditions that would allow a real cooperation between different regulators are not yet in place.

Overall, with a lack of cooperation between the ECB, responsible for money creation, and the institutions that are responsible for financial supervision, the European Monetary Union is in fact developing the most liberal version of the

lender of last resort, with open-market operations as its unique intervention tool, and, this is being achieved possibly without the explicit will on behalf of the participants to reach this model.

5. Four lessons for the future

Due to a change in the financial environment, a reexamination of the *functions* of the lender of last resort is needed.

Lesson 1: The lender of last resort has to develop mechanisms to limit contagion.

These mechanisms exist, and the first responsibility of the lender of last resort is to watch for the correct use of them. This includes the correct regulation of the interbank and OTC derivatives markets and also the payment system. This regulation can have a cost for the user of financial services, if there is a systematic use of guarantees. Thus the lender of last resort must demand guarantees in accordance to the systemic risk involved. The progress seen in the payments system indicates that we are in the right direction; nevertheless, the risk in the interbank market and in the OTC derivatives market may still be too large. Thus it is the responsibility of the lender of last resort to develop mechanisms that, just like the organized markets of options and futures, allow for a high level of guarantee at low cost. These developments are not only technological but they may require also legislative changes to allow the securitization of certain assets.

Lesson 2: In today's financial environment the interventions of the lender of last resort have to be less frequent

since the costs of a bank failure have been reduced thanks to deposit insurance which eliminates contagion through expectations. Thus, it is reasonable to believe that

in the future the lender of last resort will reduce its support to troubled institutions. This will enforce a stricter market discipline.

On the other hand, the greater awareness of taxpayers about the direct or indirect cost of bail-out operations means that while the benefits of such operation remain constant the political costs increase. This again implies that the interventions to avoid the liquidation of a bank should be less frequent.

Lesson 3: In today's financial environment it is not possible that the lender of last resort lends only through open market operations.

Indeed, recent results that use the asymmetric information hypothesis have showed that if the behaviour of the lender of last resort is too rigid, limiting its interventions to the provision of liquidity through guaranteed operations like open market ones, it becomes inefficient. The inefficiency comes from an excessive use of liquid assets by financial institutions and from the greater risk of a systemic crisis. Thus, in cases of high uncertainty and asymmetric information, the lender of last resort should provide loans to individual troubled financial institutions.

Lesson 4: The application of these principles in an international context demands a yet non-existent coordination.

Today the organizations in place do not act to prevent a crisis but merely to limit its effects, substituting the market and lending to the troubled country. Cost-benefit considerations as well as the public good status of international stability are also part of the problem faced by international coordination.

Footnotes

(1) It is interesting to point out that the development of the liberal stand corresponds to a change in taxpayers' attitude: the US, Mexico and Japan experiences showed that taxpayers have paid close attention to the cost of bank bail-out and that they have tried to limit it. Thus it should be clear to the lender of last resort that the use of public money to keep banks in business has a high political cost.

(2) See Goodhart and Schoenmaker (1995) and Santomero and Hoffman (1998) for a review of recent banking crises and how they have been solved.

(3) This aspect has been emphasized as a crucial element in the south-east Asia crisis because of the importance that the yen has in commercial exchanges. The astonishing depreciation of the yen with respect to the US dollar meant that the countries that had their currency pegged to the dollar suddenly had their currency overvalued, and thus experienced a loss in competitive position at the international level.

(4) This external financing could very well reach between 25% and 45% of GDP (Brealey, 1998). The IBS regulation has lower capital requirements for loans with a term of less than one year than for longer term loans. From this point of view the Basle Accord criteria have led to a fragile financial structure for emerging countries.

(5) Eichengreen, Rose and Wyplosz (1996) establish that this can be the principal cause of a crisis in a country.

(6) Note that each one of the national central banks does rescue financial institutions whose failure could pose a danger to financial stability. Paradoxically, there is no such policy at the European level.

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