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Questioni di Economia e Finanza

(Occasional Papers)

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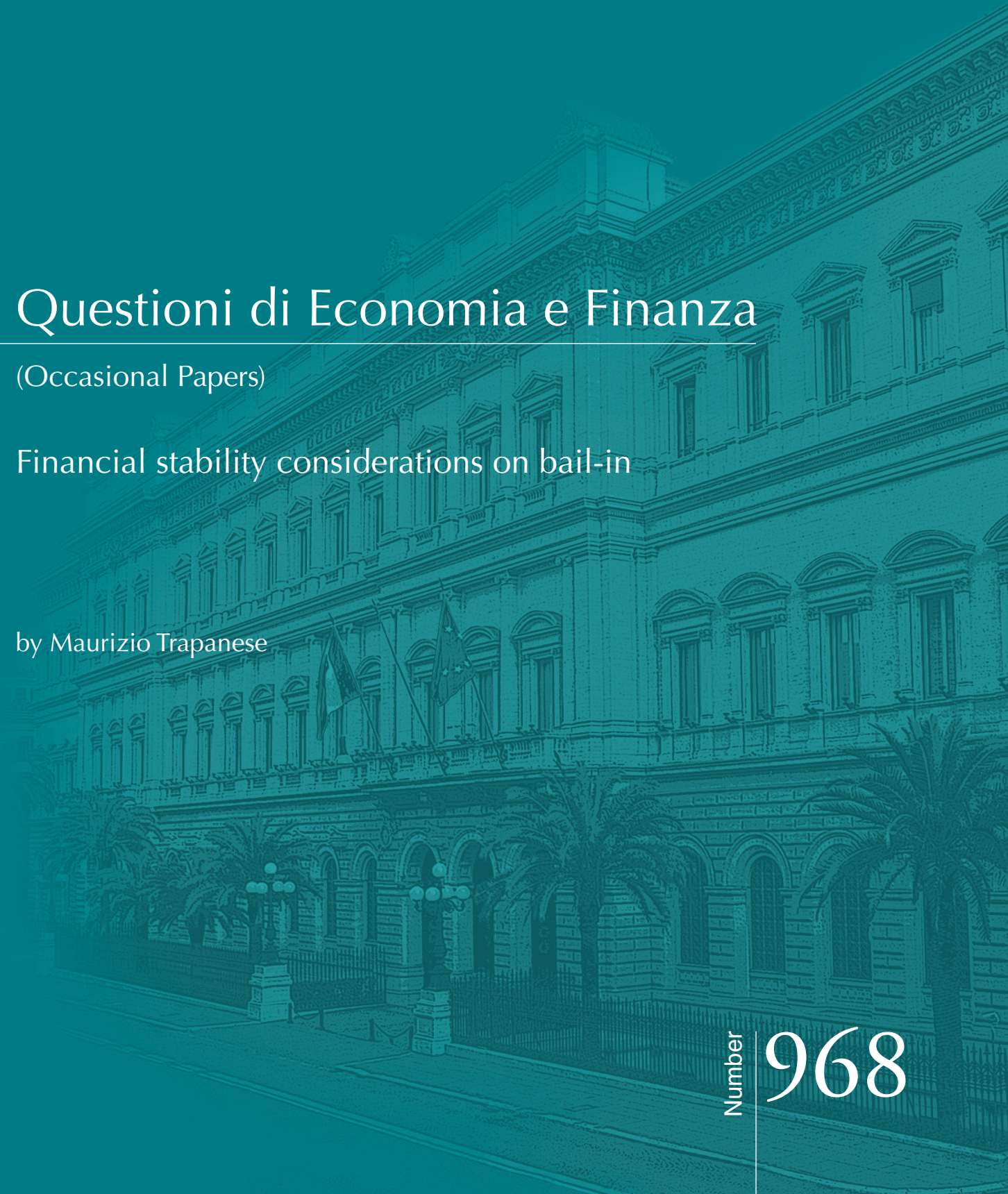

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FINANCIAL STABILITY CONSIDERATIONS ON BAIL-IN

by Maurizio Trapanese*

Abstract

This paper provides an economic analysis of the challenges to the bail-in regime in terms of its ability to affect the structure of incentives within large banks and to solve the problem posed by intermediaries that are classed as 'too big to fail' (TBTF). It first explains the peculiar role of large banks in the modern financial system and the impact of their failures on financial stability – both of which aspects are invoked to justify their differential treatment in a crisis. This discussion of the rationale for a bail-in regime helps understand the economic basis and the minimum conditions for the tool to be applied efficiently. The paper shows that European bail-in regulations involve complex rules and mechanisms that can be accompanied by discretionary aspects, potentially leading to uncertainties in the application of the procedure and difficulties in in achieving its objectives. A credible regulatory framework and clear decision-making processes would strengthen market discipline and reduce moral hazard. Finally, the paper argues that the bail-in procedure seems to be less viable, from a functional perspective, in the instance of a banking crisis with potentially systemic implications.

JEL Classification: G01, G21, G28, H12.

Keywords: financial crises, banks, financial policy and regulation, crisis management.

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1. The objective of this paper (introduction) [1]

This paper undertakes an economic analysis of the challenges facing a bail-in regime to enhance market discipline, reduce moral hazard and end the too-big-to-fail (TBTF) problem.[2] To this end, the paper examines the main theoretical contributions of the economic literature and some aspects of the EU primary legislation to develop financial stability considerations on the appropriateness of the bail-in tool to pursue its original objectives.

The focus is on large banks, given their peculiar role in the modern financial systems and the impact of their failures on financial stability. [3] The paper examines the minimum conditions needed for an efficient application of bail-in, and for which the rationale to mandate the involvement of the private sector in a banking crisis is justified. The paper also draws some examples from the EU resolution framework,[4] where the bail-in might not be fully effective in enhancing market discipline and reducing moral hazard.

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[2] The TBTF problem is an economic theory and an approach in banking supervision, which states that certain systemically important financial institutions are so large and interconnected with the rest of the financial system that their distress or disorderly failure would cause significant disruption to the wider financial system and the economic activity. In this respect, the systemic costs of their failures are much larger than the costs of any individual bail-out. Consequently, under the TBTF approach, these institutions have to be supported by the government, when facing serious troubles. For a review of the literature on causes, consequences, and costs of public bailouts, and the main elements of policy framework aimed at addressing the TBTF problem, see: Otker-Robe et al. (2011); Strahan (2013); Tucker (2013); and Dewatripont (2014).

[3] In this paper, 'large banks' are intended as those banks whose size and risk profile are deemed to be of such importance that their failure would trigger a wider financial crisis and threaten the real economy. This category may include either the global systemically important banks (G-SIBs) defined by the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS), or the banks qualified as 'significant' within the EU Banking Union (BU).

[4] As to the EU resolution framework, this paper refers exclusively to the EU primary legislation, i.e., the Bank Recovery and Resolution Directive (BRRD), and the Single Resolution Mechanism Regulation (SRMR). In doing so, it does not include the second tier regulation (technical standards, guidelines, technical advices, recommendations, etc.) developed by the EU technical authorities in the field of resolution and crisis management.

The starting point of the analysis is the 'regime change' that took place after the global financial crisis (GFC) of 2007-08, when public authorities (governments, central banks, and supervisors) were called on to end the TBTF problem within the post-GFC regulatory repair, recognizing that public bail-outs of large banks with taxpayer money would no longer be warranted. This 'regime-change' occurred because the GFC bail-outs of large banks, with immense recourse to tax-payer money, proved to create moral hazard, impair market discipline, and produce a destabilizing impact on public finance. Accordingly, during the post-GFC years new resolution regimes have been established, in the majority of the world's developed economies.[5] The new regimes aim to limit the systemic consequences of large bank failure, while safeguarding the sustainability of public finances.

The introduction of the bail-in tool is at the centre of these new resolution regimes. Bail-in involves replacing the implicit public guarantees on large banks balance sheets, with which fractional reserve banking systems have been operating for decades, with a system of private penalties. In the case of a banking crisis, it mandates the bank's shareholders and some creditors to absorb the relative losses, through a pre-defined waterfall, and to support the burden of recapitalization (Gordon and Ringe, 2015; and Avgouleas and Goodhart, 2015). This is because the bail-in tool could replace bankruptcy proceedings, allowing the bank to continue as a going concern, thus avoiding the disruptive effects of a liquidation or break-up of an ailing bank. In doing so, it is supposed to eliminate the TBTF subsidy for large banks.

Some economists have considered the bail-in as the modern alternative to the two traditional tools used to address banking crises famously described by Walter Bagehot in his influential book Lombard Street: 1) provide central bank liquidity to illiquid (but solvent) banks; or 2) wind down insolvent ones. Bail-in is a 'third way', in the sense that it seeks to self-insure banks, so that a rescue with public money becomes unnecessary (Ringe, 2016). In order to restore market discipline and reduce moral hazard, bail-in compels banks to internalize the costs of the risks they assume. This also could reduce the amount of losses in a bank failure, especially where the bail-in

[5] The first pillars of this policy strategy are in G-20 Leaders Statement of 2009 (G-20, 2009), which has been translated in a regulatory framework by the FSB, through a building-block approach consisting of a high number of reports/documents/recommendations spanning from 2010 to 2019. For a selected overview, see: FSB (2010a); FSB (2010b); FSB (2011); FSB (2013); FSB (2014); FSB (2015); and FSB (2019).

regime allows for earlier intervention and closure than a bail-out mechanism (Avgouleas and Goodhart, 2015).

Against this background, this paper contends that bail-in represents an important development, since it improves the overall policy mix available to authorities in a crisis. Ex post, it has proven to be a tool that authorities tend to manage with care, and this explains why in the post-GFC regulatory reforms a significant layer of supervisory discretion has been included to complement the automaticity of the rules.

The post-GFC reforms take into account past historical experience, which shows that the competent authorities have constantly used significant discretion when managing and resolving banking crises, with a record of positive outcomes on average. However, this paper argues that if these degrees of discretion are framed in a complicated regulatory framework, and where the decision-making structure is based upon the interaction of multiple authorities, the cumulative effects of these factors may create severe uncertainties.[6]

The economic literature agrees that market discipline can be enhanced and moral hazard can be reduced if investors foresee the price of their capital instruments and anticipate the expected losses in case they are bailed-in with a reasonable degree of certainty. Accordingly, investors would price a bank's equity capital based upon only the default probability embedded in the bank's assets and not with a view to distorting implicit public guarantees. If these conditions fail, the original objectives of the bail-in may be impaired. In this respect, the paper draws some examples from the EU resolution framework where this may apply.[7] From a functional perspective, the paper explains why the bail-in approach may be less viable in a crisis with potential systemic implications.

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[6] The relationship between regulatory complexity and systemic risk in the main regulatory, prudential, and resolution frameworks of the last two decades is examined in Trapanese (2022). In this analysis, the resulting outcome in terms of excessive regulatory complexity might turn out to be costly, and sub-optimal for crisis prevention. Since modern finance is characterised by uncertainty (rather than risk), the paper advocates a regulation rebalanced towards simplicity, which may produce Pareto-improving solutions, and encourage better decision making by authorities and regulated entities.

[7] As to the EU resolution framework, this paper refers to the EU primary legislation, i.e., the Bank Recovery and Resolution Directive (BRRD), and the Single Resolution Mechanism Regulation (SRMR). In doing so, it does not include in the analysis the second tier regulation (technical standards, guidelines, technical advices, recommendations, etc.) developed by the EU technical authorities in the field of resolution and crisis management.

This paper is organised as follows. Section 2 explains the key features emphasizing the specificity of large banks, in particular those from their liabilities side and corporate structure. Section 3 describes the main economic models used to understand the destabilizing effects of large bank failures. Section 4 examines the policy rationale underpinning the involvement of the private sector in banking crises. Section 5 explains the economic mechanism of the bail-in tool and its effects on banks' behaviour. Section 6 elaborates the approaches set forth in the economic literature regarding the minimum conditions for an efficient bail-in regime. Section 7 draws some examples from the EU resolution framework where such conditions may be challenged. Section 8 offers some reflections on the capacity of the bail-in to end the TBTF problem. Section 9 concludes.

2. Why large banks are different

Large banks are subject to a differentiated treatment in the case of a crisis, because they perform a role in the intermediation process very different from that of the other banks or financial institutions, and because of the existence of negative externalities associated with their failure. Their balance sheets and business models exhibit unique features, in terms of a higher degree of interconnectedness with the rest of the financial system, and a more complex corporate structure, often associated with a significant cross-border reach.

Most importantly, large banks have 'financial liabilities', which carry on specific functions, whose amount is far greater than other liabilities. These 'financial liabilities' include a large array of products, such as foreign and domestic (uninsured) deposits, checking accounts, commercial papers, trading derivative liabilities, insurance policies, and repurchase agreements (repos).[8] These liabilities are more than claims to a future stream of income; some of them (e.g., bank deposits or repos) are a source of liquidity; others (e.g., derivatives or insurance policies) are also risk-shifting instruments.

The specificities of large banks' have been extensively modelled in the economic literature. Sommer (2014), and McAndrews at al. (2014) explain in detail why a financial firm's insolvency

[8] This concept of financial liabilities excludes from the scope of the analysis leasing, factoring, lending or mortgage companies. These firms do not issue financial liabilities, but raise their funds from banks and on the financial markets. In this respect, these firms are not financial firms for our purposes. For these considerations see: Sommer (2014); and McAndrews at al. (2014).

is different in nature from the insolvency of an ordinary (commercial or industrial) firm. In their models, large banks perform a special role given the amount and the functions of the 'financial liabilities' held in their balance sheet, which explain the economic reasons for a special insolvency treatment of large banks.

The objective of optimal insolvency laws would be to protect these 'financial liabilities', in order to preserve their liquidity or risk-shifting functions, which can have systemic implications. Generally, this objective is obtained at the cost of impairing the other liabilities. This can happen because this cost is less than the cost of impairing 'financial liabilities', which have a bearing on liquidity or risk shifting functions, and can be enormous, if it takes the form of systemic risk. For these reasons, 'financial liabilities' are given priority treatment in insolvency law, i.e. they have to be paid first in line, and often first in time, before payments to other creditors are made. Some 'financial liabilities', like bank deposits or insurance policies, can be firm-specific. This means that they are more valuable if kept with the firm's business, than paid off in an insolvency distribution. This is exactly why in the case of a large bank, a reorganization is more efficient than a liquidation, because a reorganization preserves the value of the firm-specific liabilities (Sommer, 2014).

Large banks are not single entities and usually they have an international scale for their business and operations. There are several reasons for this corporate structure: the different regulatory and prudential frameworks governing the various segments of financial intermediation (e.g. banking and insurance); the fiscal policies of the firm, and the specificities of the business model undertaken. The parent company is typically a bank or holding company. Most of the affiliates are centrally controlled, and share management, personnel, business, reputation, and operations. [9] The result is a complex organizational structure, which can be decomposed in an insolvency procedure with difficulty.

For these reasons, the classical resolution mechanisms, such as those applied to small or medium-size, primarily domestic, banks with relatively simple organizational structures and funding sources may be not equally effective in the crisis of a large bank. To complicate things further, the viability of a bank is to be ensured on a continuous time basis, since its operations cannot be suspended for an indefinite period. Things are even more complicated, given that large

[9] Some of the subsidiaries have 'financial liabilities', others do not. Banks, insurers, securities dealers, derivatives dealers are in the first sample; mortgage banks, venture capital firms, asset holding companies are in the second.

banks crises give very little warning. In order to preserve liquidity and solvency at the system level, the management of these crises must be decided in a very short time span.

In the case of smaller banks, authorities can exercise statutory powers to break-up the bank, by transferring assets (e.g., performing loans) and liabilities (e.g., retail and other short-term deposits) to a 'good bank' (the 'bridge bank'), in such a way that the 'bridge bank' remains solvent and can be sold at a later stage. The remainder is left in the original bank (the so-called 'bad bank'). Those creditors that are transferred to the 'good' bank are preferred to the other creditors. When a large bank goes into troubles, the division of assets and liabilities to be transferred into 'good' or bad' entities is extremely complex. Since these banks generally take the form of complex and international groups, with a significant share of assets and liabilities governed by foreign laws or held through foreign branches or subsidiaries, the effectiveness of nationally based resolution tools may be in question.[10]

It is often the case that large banks have little cross-border branching, since their preferred option involves the establishment of subsidiaries, which act as legally separate entities in foreign countries. This tends to complicate the cross-border application of insolvency proceedings even further. In the case of a large cross-border banking group crisis, cooperation is more difficult, since jurisdictions tend not to cede their primacy on their local entities, being potentially conducive to sub-optimal outcomes.[11]

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[10] The insolvency procedure of international firms is far more complex than that of domestic firms. Cross-border insolvency may require multiple and competing insolvency administrations of a firm, with each administrator using its own law to conduct the proceedings on the entity falling under its legal responsibility. The norm is that of a central administrator with other jurisdictions in a supporting role, conducting 'ancillary proceedings' that assist the main proceeding. In a liquidation, the ancillary proceeding collects assets and distributes them to a central receiver for distribution. In a reorganization, the ancillary jurisdiction enforces the stay and does whatever asset collections are necessary. For a detailed examination of the interaction among the central and the ancillary proceedings in a cross-border banking insolvency, see Sommer (2014), and McAndrews at al. (2014), who base their analysis mainly on the US model.

[11] However, there are some incentives for cooperation. In the case of ordinary firms, local liquidations will destroy value, and the automatic stay will buy time for cooperation; industrial insolvencies are common and large industrial firms are spread over the world. This supports reciprocity: a jurisdiction may agree to a subordinate role now in return for a central role in the future. These incentives are far weaker in financial firm insolvencies, since they are rare and asset specificity less intense. See: Sommer (2014); and McAndrews at al. (2014).

3. Large bank failures and financial stability

3.1 The "monetary view" of banking crises

Large banks are highly interconnected with the rest of the financial system. The failure of a large bank can trigger social costs through a variety of channels, on a scale that is much greater than in the case of a smaller bank. A large bank failure has the potential to impose losses across the financial system and the economy at large that are a multiple of the losses incurred by that bank's investors.[12] The high degree of maturity transformation and liquidity mismatch incurred by these banks exacerbates their vulnerability to a sudden decline in the value of their liquid assets or a sudden increase in demand for liquidity. Moreover, their assets tend to become illiquid in times of general stress, thus aggravating the shock and potentially spreading contagion across the board.

The economic literature has provided consistent models to shape the destabilizing effects of a large bank's failure on the financial system. Some of them underline that banks are special since they issue deposits or other money-like liabilities.[13] This monetary view of banking crises has been around since it was first explained by Friedman and Schwartz, in their famous book on the monetary history of the US, who argued that the Great Depression was aggravated by the failures of banks that contracted the supply of bank liabilities (that is money).

The production of money-like instruments and/or services can be considered as one of the most important functions exercised by banks. The demand deposits issued by banks are the main factor explaining the failures of banks in the case of depositors' run. The failures of large, complex and interconnected banks are not only costly in terms of destruction of asset values, but also destabilizing, as these failures have the potential to transfer risks to other financial institutions,

[12] As an example, the market capitalization of Lehman Brothers at the end of January 2007 was about $60 billion, and that of the troubled US banks during the GFC was approximately $1.2 trillion. The economic consequences of the GFC on the US economy for the years 2008-09 was much larger. The US suffered fiscal outlays of about $5 trillion, and the US economy contracted by 3.5 per cent in 2009 (about $9 trillion). These US figures do not include of course the costs incurred in the rest of the world economies. For these data, see Armour (2014).

[13] A bank is not an ordinary commercial company, which can continue its business while in insolvency. A bank cannot, since no other entity would voluntarily deal with an insolvent bank, neither for a very short period. Simply, the essence of bank's specificity is its solvency; by definition, an insolvent bank is not a going concern. As to the classical references for the bank's specificity, see: Baltensperger (1980); Diamond and Dybvig (1983); Fama (1985); Goodhart (1987); and Bernanke and Blinder (1988).

determining more instability for the system as a whole.[14] These liabilities confer money-like or liquidity services that may be impaired in a failure and are runnable. If the holders of these 'financial liabilities' run in order to avoid the consequences of a possible failure, the bank has to borrow to replace the funding that has been lost, and/or sell assets quickly. The asset sales can lead to deeply discounted prices (that is, fire sales), and to losses, further undermining the solvency of the bank, and spread distress on other banks or financial firms with similar portfolios of assets.

McAndrewes at al. (2014) show some evidence in support of this role of uninsured 'financial liabilities' in banking crises. Using data on all failed banks resolved by the Federal Deposit Insurance Corporation (FDIC) from 1985 to 2011, first, they say that banks more reliant on uninsured 'financial liabilities' in the year before failure, experience larger contractions in these liabilities in the ensuing year. Second, they show that the cost of failures to the FDIC was increasing in the amount of uninsured liabilities on a bank's balance sheet in the year before the crisis. Finally, they take these findings as conclusive evidence that a greater reliance on uninsured liabilities leads to runs and fire sales, which in turn increase the costs of the failure. These findings are consistent with the hypothesis that the holders of these liabilities are prone to runs.

The 2023 US banks' failures have drawn attention to the potentially destabilizing role of uninsured deposits in modern banking systems, given the increased speed of withdrawals allowed by technological progress, and experienced during the crises. The 2023 events revealed the special vulnerability of banks to runs by small and medium-size firms that rely on uninsured bank deposits to meet their business and other high-frequency operational needs. Like other runnable liabilities, they risk creating contagion across the financial system. If the proper functioning of the financial system is seriously impaired, the real economy receives less liquidity to fund productive activities. The lack of credit drives down total output, with potentially destabilizing effects on economic growth and social welfare. As we know, these are the classical arguments in favour of bank capital regulation and supervision.

3.2 Large banks and "tail risks"

Other strands of the economic literature consider banks as intermediaries that gather savings of households and lend to productive firms, emphasising their role in delegated monitoring and

[14] The failure of a small bank is costly, in terms of lost local output, but it does not threaten the smooth function of the overall financial system. Aschraft (2005) explains how even small bank failures destroy the private information that banks develop about their clients so that borrowers become credit constrained after the bank's failure.

information sharing among different economic sectors.[15] In this context, contagion within the financial system is particularly harmful, since these banks collectively perform functions that are essential for the functioning of the real economy. They not only make credit available to non-financial firms, but they also perform valuable screening and monitoring functions in relation to funded business projects (Bernanke, 1983; and Armour, 2014).

Typically, large banks have a high degree of leverage, implying that an increasing level of risk can be embedded in the their balance sheets.[16] Given the dimensions of their balance sheets, large banks can be exposed to the so-called 'tail risks',[17] which is difficult to measure, given that even a small increase is hard to verify, and banks have creditors unable to monitor their conditions on a continuous time basis. Diversification and hedge schemes may not suffice in reducing the assets' variance. The materialization of these risks has potential destabilizing effects on the individual banks and the system as a whole.[18] In the case of large banks, the spread of contagion occurs in an amplified manner, since these banks are highly interconnected, meaning that problems at one can easily be transmitted to others, via a number of channels. [19] The mechanisms for the

[15] The classical references for the theory of asymmetric information, delegated monitoring, and bank specificity, are: Leland and Pyle (1977); and Diamond (1984).

[16] For a comprehensive survey comparing the degrees of leverage across firms, banks and countries, also within an historical perspective, see Kalemli-Ozcan et al. (2012). According to these authors, debt to equity ratios of 1:1 are usual for ordinary firms; financial firms' ratios are much higher, about 15:1–30:1 for banks and securities firms, and somewhat less for insurers.

[17] Tail risk is the financial risk of an asset or portfolio of assets moving more than three standard deviations from its current price, above the risk of a normal distribution. Tail risks include low-probability events arising at both ends of a normal distribution curve. However, financial markets are not perfect as they are largely shaped by unpredictable human behaviour, so that the distribution of returns is not normal, but skewed. Tail risk materializes when a rare, unpredictable, and very important event occurs, resulting in significant fluctuations in the value of the stock. These tail events are often referred to as black swan events, whose likelihood is greater than the one predicted by traditional strategies.

[18] According to Sommer (2014), in the period 1980-2010 at least seven episodes can be viewed as tail events. These are the following: equity market crash of 1987; 1994 bond market crisis; 1997 Asian financial crisis; 1998 Russian financial crisis and the Long-Term Capital Management episode; dot-com bubble collapse; subprime mortgage crisis, the crisis of the Lehman Brothers, or the collapse of the AIG group during the GFC.

[19] A large bank can be a counterparty for a high number of other market participants. The liabilities of one bank can be the assets of others, which can be devalued in the case of a financial stress: A bank can be forced to fire-sell assets leading to depressed prices for assets that other institutions use as collateral. A large bank's default or even the fear of a possible default determines panic that spreads to other institutions. Brunnermayer (2009), Acharya et al. (2011),

transmission of the crisis to other parts of the financial system are of different nature since large banks are highly interconnected each other.[20]

Systemic risk events are not common, and often trace back to multiple causes, but their pre-conditions hinge in the balance sheet structure of large banks. In particular, the key reason underlying such systemic consequences can be traced to the large banks' liability structure, which – as shown in the previous section– implies heavy reliance on uninsured 'financial liabilities'. This view about the contribution of uninsured financial liabilities to systemic instability does not exclude that also illiquid asset holdings or organizational complexity coupled with a multi-layered and internationally based corporate structure have the potential to produce similar effects. More precisely, in terms of the behaviour of large and systemic banks, these features are normally additive, and as such may produce multiple and self-reinforcing effects while banks approach failure.

The non-bank financial intermediation sector has created innovative forms of liabilities, such as repos, that provides services functionally equivalent to traditional banks' deposits.[21] Similarly, other forms of uninsured financial liabilities, such as commercial paper issued by banks, are also demandable at par for large customers that request the financial firm to buy back its paper. As a result, a large amount of the funding of big financial firms is made up of uninsured financial liabilities, which provide money-like services, and create the conditions for customers' runs.

Troger (2018), and Gorton and Metyrick (2012) offer a detailed description of the different types of systemic consequences from a failure of a large bank as occurred during the GFC.

[20] According to Sommer (2014), the mechanism for the transmission of the instability is not so important; only the results matter. It could be a pure panic attack, with bad news for one bank imputed to all; or a markdown of an asset class by one bank triggers markdowns for all banks; Or an industry-wide hedging model goes broken; or a large bank's liabilities are another large bank's assets; Or a clearinghouse goes in difficulty blocking liquidity. A role can be played by leverage and liquidity stress. In this case, the asset side also becomes illiquid, since asset liquidity dries up precisely when a large bank most needs this liquidity.

[21] According to Gorton and Metrick (2012), repos can be considered a type of money, because they are liquid, functionally demandable at par due to their largely overnight tenor, and able to function as an overnight store of value.

4. The policy rationale for a bail-in regime

4.1 Public bail-outs and their effects on the financial systems

Government decisions involving public-sector bail-outs have been considered for decades a rational and policy-based response to avoid the potentially destabilising effects of a large bank's failure, averting fire sales and contagion. Since banks are not ordinary commercial firms, governments have often decided to recapitalize them using taxpayer funds, thereby preventing further damages from a bank failure. However, the use of taxpayer money may undermine financial stability if it gives rise to a situation of unsustainable public finances.[22]

The policy rationale for governments' bail-outs and a critical evaluation of their effects on the financial system, have been extensively examined in the economic literature. [23] It is stressed that the recourse to public-sector bail-outs allows market participants to predict this kind of decisions, so as to include an implicit government's guarantee in the price of bank capital, with the effect to reduce large banks' default probability. Such implicitly guaranteed banks, considered too-big-to-fail, show lower risk premiums and are able to raise capital at lower costs.

A number of empirical studies confirms these distorting market prices mechanisms.[24] In this context, bank equity holders and managers have the incentives for an excessive risk-taking behaviour (moral hazard), which ultimately leads to an increased level of leverage, and to

[22] In some cases, there can be positive (non-risk adjusted) returns from bail-outs on government equity stakes. For example, this has been the case of JP Morgan Chase, Wells Fargo, Goldman Sachs, Crédit Agricole, BNP Paribas, and Société Generale, for the years 2008 and 2009. For this evidence, see Hertig (2012).

[23] For essential references, see: Zhou et al. (2012); Avgouleas and Goodhart (2014); and Troger (2018). The main economic arguments to replace public bailouts with private sector in banking crises have been put forward even before the GFC. See, for example, Eichengreen and Ruehl (2000).

[24] As to the US banking markets, Schweikhard and Tsesmelidakis ((2012) show that in the US CDS markets the US major banks have enjoyed risk premiums on their debt significantly different from the rest of the US banking system in the years of the GFC. Santos (2014) indicates that in the 20 years preceding the GFC, investors systematically accepted much lower spreads on bonds issued by the largest US banks as compared to bonds issued by smaller banks. Tsesmelidakis and Merton (2012) estimate the funding advantage of the 74 largest US banks benefiting from implicit government guarantees. Ueda and Weder-Di Mauro (2012) find an average increase of 70 basis points in the structural subsidy as measured in the credit ratings of large banks in the years 2007, 2008, and 2009. Morgan and Stiroh (2005) show that the relationship between bond spreads and ratings was lower for TBTF banks than for other financial intermediaries during the 1990s.

inefficient investment decisions.[25] Furthermore, market discipline is hampered when a bank's risk bearing capacity is not the guiding criterion for its capital market pricing.

The implicit government bail-out guarantee to larger banks could also have an undesirable effect on the competitive conditions of banking markets. The advantage of lower funding costs could give larger banks the possibility to cut margins ad to eliminate smaller competitors. In this way, the implicit subsidy distorts the pattern of the intermediation towards larger banks and away from smaller banks and non-banks (Gropp et al., 2011; and Afonso et al., 2014). However, this shifted intermediation also could have positive outcomes, since larger banks are normally considered to be more regulated, safer and less risky. Moreover, much of the subsidy could create better conditions for the banks' borrowers, mainly in the form of lower interest rates (Kovner at al., (2014).

Adrian and Ashcraft (2012) have generalized to the case of the implicit government guarantees the conclusions reached by Merton (1977) and Merton and Bodie (1993), who have been the first to have modelled the effects on market discipline of an explicit public guarantee, that is the banking deposit insurance being established as part of the safety net. The same holds for the level playing field for the provision of financial services to the economy, which is undermined in the case bail-outs make bank's funding costs depending on the financial strength of their sovereign.

After the GFC, public authorities recognised that public bail-outs of large banks could worsen moral hazard, and impair market discipline. In order to limit the systemic effects stemming from a large bank's failure, and safeguard the sustainability of public finance, they mandated the definition of a regulatory framework in which the private sector could be requested to bear most of the costs of these failures. These new regulatory regimes have been designated in such a way to undo any government implicit subsidy and credibly connect banks' funding to the level of risks incurred, in order to reduce the excessive risk taking, induced by moral hazard.[26]

[25] As to the effects of implicit subsidies on bank behaviour and risk taking in the international credit markets, see the following papers: Gropp et al. (2011); Gadanetz et al. (2012); Brandao-Marques et al. (2013); and Afonso et al. (2014).

[26] An economic analysis of the bail-in as a tool to reduce moral hazard and mitigate systemic risk, can be found in the following: Coffee (2010); Avgouleas and Goodhart (2014); and Gordon and Ringe (2015).

4.2 Bail-in under bounded rationality

The bail-in tool has the objective to ensure the involvement of the private sector in a banking crisis, constraining the risk bearing capacity of the economic agents who invest in bank capital. [27] Its purpose is to provide a mechanism with which to restore balance sheet stability, at the expense of its shareholders and creditors, without the need for publicly funded capital injection. It should not be a penalty for the failure; it primarily aims at an efficient allocation of risk and does not intend to express any assessment of who is to be called for the bank's failure. (Gleeson, 2012; Troger, 2015; and Troger, 2018).

For this tool to work efficiently, the condition is that the private sector involvement should not undermine the viability of the essential functions of the resolved bank. In other words, the losses to be borne by holders of bank capital should not reduce the bank's clients confidence on the capacity of the bank itself to continue to provide its critical services (liquidity provision, and risk-shifting) during resolution and even afterwards. According to Zhou et al. (2012) and Sommer (2014), only under these conditions can bail-in preserve the incentives attributed to insolvency proceedings, but avoid overly disruptive effects, preventing liquidity stress, averting file sales and ultimately the disorderly liquidation of financial contracts. Along the same line of reasoning, Schleifer and Vishny (2011) offer a theoretical discussion about the effects that complex and time-consuming ordinary insolvency proceedings may have on undermining the confidence of the banks' clients and destabilizing the financial markets.

In doing so, bail-in enhances the capacity of the resolution framework to eliminate the incentives a disorderly termination of financial contracts in run-like scenarios that potentially go beyond the bank in trouble (Troger, 2018). [28]

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[27] In the case of a purely domestic bank, the effect of shifting from bail-out to bail-in primarily is to transfer the burden of losses from one set of domestic payers (the tax-payers), to another, the savers. On a theoretical ground, it is far from clear whether and why the latter have broader capacity to absorb bank rescue losses than the former. One argument is that savers or their financial agents have made an ex ante choice to purchase the claim on the bank, performing a monitoring function, whereas the taxpayer had no such option. The counterargument is that individual savers, small- or medium-size pension funds do not have the expertise to act as the economic theory mandates. Thus forcing them to pay for a bank failure would not per se be a welfare improvement. These difficulties could be overcome in the case the regulatory framework defines severe limits on the possibility to acquire banks' liabilities. For these considerations, see Avgouleas and Goodhart (2015).

[28] Bail-ins aim to avoid the need for formal insolvency proceedings, by restructuring the bank's balance sheet and ensuring the continued survival of the bank, without immediate dismemberment. To this extent, bail-ins can be

The bail-in tool restores the basic insolvency principle whereby shareholders and creditors must bear the bank's losses, according to a certain order of priority, before any public funds are used (Avgouleas and Goodhart, 2015). In this respect, since the continuity of the critical functions performed by large banks has to be safeguarded, shareholders and creditors cannot suffer losses at the end of the insolvency procedure, where creditors satisfy themselves pro rata on what is left after the liquidation of the debtor's assets. It is necessary that this occurs ex ante.

The contribution of the private sector to bear the costs of a banking crisis has to be designated carefully; otherwise, it can act as a crisis accelerator, since the haircuts imposed on the investors' financial instruments may make it harder for troubling banks to refinance themselves, thus increasing pro-cyclical systemic crisis effects (Avgouleas and Goodhart, 2014). If investors base their decisions on full rationality, bail-in cannot trigger a systemic crisis, since it has the capacity to limit the loss bearing to a sub-set of market participants (Sommer, 2014).

This certainly holds when only one bank, whatever its size, experiences serious difficulties. Even when the number of troubled banks increases, recapitalization from the private sector can be a successful way-out strategy. The only preconditions for such an outcome is that: 1) the banking sector as a whole should have adequate capital and other liabilities subject to bail-in; and 2) the liquidity provided by the central bank can be accessed without limits (Philippon and Salord, 2017; Troger, 2018).

However, the hypothesis of full rationality as a guiding criterion for the decisions of the economic agents is purely theoretical. With the more common hypothesis of bounded rationality, runs may occur even if investors have no reason to believe that their bank is in trouble. Since Diamond and Dybvig (1983), who have studied modern bank runs at deposit-taking institutions, we have understood that the financial system can be shocked in proportions that go well beyond the above-mentioned safeguards.

Drawing from the US experience of the 2007-08 financial crisis, Avgouleas and Goodhart (2014) stressed how the bail-in mechanism may lead to irrational fears that similar haircuts also could be imposed on creditors of other banks, thus inducing investors to run. The spread of investor panic can be mitigated if there is in the system a sufficiently large layer of long-term, non-runnable,

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considered another kind of resolution tool, which, like temporary public ownership, preserves the bank as a whole as a going concern, imposing losses on creditors and shareholders (Gleeson, 2012).

high quality and easy to be bailed-in liabilities that credibly ensures the boundaries of private sector involvement in a crisis. The objective is that the other creditors should be reassured the haircut tool will not reach their claims as well (Micossi et al., 2014).

Under bounded rationality and with an unclear scope and possible extension of the crisis, only the existence of a second line of defence - in the form of a credible government backstop to be activated for situations in which the bail-in instrument is insufficient - has the potential to arrest panic among market participants. Even when there is a credible private sector involvement, a strong public backstop is required for all runnable contracts on the liability side of the banks' balance sheet; on the contrary, incoming crises could be accelerated.

In modern financial systems, runs also may occur outside the area of deposit-taking credit institutions. Several studies have verified the scope of the public backstops needed to ensure stability also with respect to non-bank financial institutions (Gorton, 2009; and Troger, 2018). In this case, a key issue refers to the question of how far these backstops should reach to ensure the stability of these segments of the financial system too, that is what parts of their balance sheets should be protected. This does not impair the capacity of the private sector's involvement in a crisis to foster market discipline and contain moral hazard and excessive risk-taking behaviour.

5. The economic mechanism of the bail-in

5.1 The prisoner's dilemma and Pareto optimality

Bail-in can be understood as the modern alternative to the two tools traditionally adopted by central banks to manage banking crisis, i.e. to provide central bank liquidity for banks that are illiquid, and to wind down insolvent banks. [29] It represents the "third way" to handle a failing bank, by seeking to *self-insure* banks, so that a rescue with public money becomes unnecessary. A strong intellectual support for this interpretation of the bail-in may be found in the difficulty to distinguish

[29] Walter Bagehot, has famously described these two tools in his influential book *Lombard Street*, published in 1873. Bagehot advocated that a lender of last resort in a crisis should lend at a penalty rate to solvent but illiquid banks that have adequate collateral. The doctrine has been criticised as having no place in the modern interbank markets. Bagehot's prescription aims to eliminate the coordination problem of investors at the base of the crisis. It is still a useful guide for action when the interbank market stalls. It makes clear that discount-window lending to entities in need may be necessary in a crisis. Bagehot's doctrine, however, is easy to state and hard to apply. It requires the central bank to distinguish between institutions that are insolvent and those that are merely illiquid. For essential references, see Ciocca and Sannucci (1990); and Ringe (2016).

a liquidity crisis from an insolvency situation. Many economists assert that the dividing line between the two situations may become increasingly blurred, since insolvency and illiquidity are virtually indistinguishable during a real crisis.

Furthermore, the possibility to carry out a comprehensive assessment is usually limited due to time constraints. Since the aim of the bail-in is to preserve the bank as a going concern, its 'trade' creditors (short-term creditors, payment services customers, securities and trading exposures, etc.) must be preserved, so that the bail-in is to apply to the long-term creditors of a bank (bondholders, and holders of subordinated debt). In such a situation, the crucial question becomes how to distribute the emerging losses, and decide which creditors should accept what quantities of these losses.

In the case of the application of the bail-in, bondholders usually have two choices, plus a third one, which may become very inconvenient. Under the first choice, bondholders can decide to agree with the proposed operation, and exchange their subordinated bonds for shares, hoping that the capital increase is successful and that the value of the shares rises in the subsequent periods. The second choice implies that they hold their subordinated bonds until maturity, hoping that a bail-in does not apply. The third, which can be less convenient, is to try to sell their bonds now, accepting the likely losses.

The key aspects of the game theory and the prisoner's dilemma emerge in this difficult decision-making process.[30] Bondholders have every interest in not accepting the proposed exchange, in order to keep their bonds and, upon maturity, have the loan returned. By doing so, however, they can incur in a risk, because, if all bondholders make this choice, the chances of resolution of the bank, which leads to bail-in and cancellation of subordinated bonds, increase. On the other hand, the success of the operation seems complicated, since the majority of bondholders

[30] The prisoner's dilemma, one of the most well-known concepts in the modern game theory, is a paradox in decision analysis, in which two individuals acting in their own self-interest do not produce the optimal outcome. It represents a paradigmatic example of how strategic thinking between individuals can lead to suboptimal outcomes for both players. The typical prisoner's dilemma is set-up in such a way that both parties choose to protect themselves at the expense of the other participant. As a result, both participants find themselves in a worse state than if they had cooperated with each other in the decision making process. Solutions to prisoner's dilemmas focus on overcoming individual incentives in favor of the common good. In the real world, most economic and other human interactions are repeated more than once. This allows parties to choose strategies that reward cooperation or punish defection over time. For essential references, see the following: Schneider and Shields (2022); and Stanford Encyclopedia of Philosophy (2024).

would have to put aside their interest, accept risks and losses and convert their bonds into shares. From a theoretical point of view, the main effect from the bail-in in a crisis might be to solve the prisoner's dilemma, and to restore Pareto optimality[31] to the class of outcomes of individual choices, thus making it easier for authorities to intervene, even in a cross-border context.

This economic substance has been considered effective for ensuring private sector participation in the refinancing of a troubled bank, also in the case of a large bank operating in a number of different national legal frameworks. The primary problem with this model of privately funded recapitalization is that it is more or less impossible to identify every significant creditor of a large and international bank in any reasonable timescale, and even harder to persuade them to agree amongst themselves in the short period available to those charged with resolving a bank. These issues are more acute where a bank is significantly dependent on capital markets funding with a dispersed bondholder group. In this context, the prisoners dilemma will arise, and orchestrating all the parties towards a consensual solution in a weekend timetable may just prove too challenging (Gleeson, 2012).

As the Lehman episode showed, the path towards a consensual solution among all the international actors over a tight timetable has proved to be too challenging. After the GFC, the FSB and the IMF have fostered progress towards international agreements in order to define ex ante coordination mechanisms for the actions and decisions to adopt by the relevant authorities in a crisis. It might contribute to reach coordinated solutions in an international context, with so many actors involved, and within the given time constraints.

The trade-off between ex post and ex ante optimality has been taken into account by a number of economic models, which tend to examine the linkages between bail-in policies, the cost of debt, and the bank managers behavior in dynamic settings (Pandolfi, 2018). In this respect, bail-in is considered ex post the first-best policy for recapitalizing failing banks, but ex ante it can generate a time inconsistency problem, just like bail-outs. In the previous paragraph, we have seen that the main problem with bail-outs is the weakening of market discipline induced by implicit public guarantees. In the case of the bail-in, the problem is the implied increase in banks' funding

[31] Pareto optimality is an economic state where resources cannot be reallocated to make one individual better off without making at least one individual worse off. It implies that resources are allocated in the most economically efficient manner, but does not imply equality or fairness. An economy is said to be in a Pareto optimum state when no economic changes can make one individual better off without making at least one other individual worse off. For a review, see Roll (1977); and Schumpeter (1979).

costs, which can undercut bankers' incentives to monitor their loans. This makes investors less willing to lend their money to banks and, when moral hazard is acute, prevents banks from raising funds and lending to non-financial firms. So, despite being the first-best policy to deal with troubled banks, bail-in can have ex ante negative effects. To avoid credit crunch, policy makers should pre-commit themselves to make use of a policy mix, including bail-in together with other resolution mechanisms, such as bail-outs, which can mitigate the adverse effects of bail-in on banks' funding costs and monitoring incentives.

5.2 An 'at risk' debt requirement

In the aftermath of the GFC, many authors have suggested to restructure the liability side of a large bank's balance sheet, so that the un-insured financial liabilities be separated from the equity capital by an amount of long-term debt (Calello and Ervin, 2010; Stein, 2012; and Tarullo, 2013; and McAndrews et al., 2014). They have advocated that large banks should be required to issue a certain amount of long-term, 'at risk' debt, to be converted into equity in resolution. If issued in sufficient quantities, the 'at-risk' debt requirement immunizes the holders of un-insured financial liabilities from losses and can help to reduce their incentives to run.[32]

This approach aims to mimic the effects of the normal insolvency procedures, in observance of the no-creditor-worse-off (NCWO) principle, which requires that no creditor shall incur losses in resolution more than it would have incurred in a liquidation scenario. However, the compliance with the NCWO principle is extremely difficult to achieve in a resolution. This is particularly true in situations in which the bail-inable liabilities are governed by laws of different jurisdictions, where insolvency laws are not harmonized.[33]

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[32] The essence of the bail-in is that some creditors should have part of their claims against the bank written down in full or in part, after the write down of lower ranking subordinated claims and equity. Such senior creditors may receive new shares in the bank, but subordinated creditors may have their claims simply extinguished. In terms of order of priority, capital instruments are affected first (common equity tier 1, additional tier 1 and tier 2), followed by: subordinated junior liabilities; uncovered senior liabilities; uncovered deposits; and the DGS the bank is affiliated to for the covered deposits. Each class has to be affected before the following class can be impacted, and within each class, creditors are subject to pro-rata. See Gleeson (2012).

[33] This is the situation prevailing in the EU BU, where the national insolvency procedures are still not harmonized, and where the framework for bank crisis management complies with multiple criteria. Majnoni et al. (2021) suggest that a broader effort is required to streamline the current criteria into a single rulebook, achieving effectiveness mainly through simplification. Its adoption in the BU would help to frame a common approach to failing banks of all sizes

Technically, bail-in is a process which applies to some but not all of the senior creditors of a bank. As outlined above, a bank's bailed-in senior creditors in certain circumstances have part of their claim written down in full or in part, after the write down of lower ranking subordinated claims and equity. Such senior creditors may receive new shares in the bank, but subordinated creditors have their claims extinguished.

An 'at-risk' debt requirement would also have helpful incentive effects, as it would tend to discourage the over-issuance of runnable un-insured financial liabilities. These tools would improve the likelihood that failures could be avoided, or be of a scale that can be managed orderly by authorities. This new requirement serves as capital to be used in resolution, with the objective to limit runs by holders of un-insured financial liabilities. At the end, resolutions turn out to be more frequent, but also to be managed more orderly.[34] In this context, the holders of un-insured financial liabilities are less likely to run a bank with both long-term debt and equity in its balance sheet, than a bank having only equity (even in larger amount).

Authorities should consider carefully the reaction function of market participants for these 'at-risk' debt instruments, given the peculiarities of their pricing on the markets. The markets dynamics should be carefully assessed, even before any decision on the issuance of long-term debt is taken. In this respect, the discretionary powers assigned to supervisors in the bail-in process could prevent the holders of bail-in eligible debt to calculate correctly their risk of loss, thus making difficult to price such instruments on the markets. In other words, since the activation of the bail-in trigger and the quantum of the resulting write-down or conversion are in the discretionary domain of the regulators, it would not be possible for the holders of bail-inable debt to make any meaningful estimate of their risk of loss. This would make such debt difficult or impossible to price on the markets.

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and would provide a unifying force and a solution to the geographic and institutional fragmentation of the current set-up.

[34] Some authors explain some reasons in favour of a requirement scaled to the amount of uninsured financial liabilities. This requirement would provide a buffer in resolution to protect the holders of these liabilities; and would avoid a run, thus diminishing the messiness of a large bank's failure. By imposing such a requirement, expected to be costly, the incentives for a reliance on un-insured financial liabilities can be reduced, with the effect to improve the stability of the overall funding of the bank. Finally, tying such a requirement to the amount of the un-insured financial liabilities would force banks to internalize the externalities (the risk of fire sales) stemming from the issuance of short-term, money like liabilities. See: McAndrewes at al. (2014); and Stein (2012).

Since the activation of the bail-in necessarily involves a degree of discretion that cannot be eliminated, the pricing process is facilitated since supervisors have created a credible bank's capital regime, and have given a broad guidance as to in what circumstances they would expect to use their bail-in powers. If a bank is not allowed to operate at the minimum levels of the solvency ratios, the probability of a default decreases, and this situation can be observed, with positive effects for the pricing of the bail-in instruments on the markets.

This objective can be accomplished by either stating contractually that, in the case of need, the creditor's outstanding amount is reduced by his contribution to the required recapitalization, in exchange of the bank's shares, or providing the authorities with statutory powers to achieve the same result (or a 'hybrid' combination of these two methods). However, market participants should take into account that the losses stemming from a liquidation or the dismembering of a bank in a resolution are likely to be higher, and investors in bail-in debt instruments are likely to be better off than under the alternatives of the insolvency or the use of other resolution tools. This could contribute to a more meaningful estimate of losses, in the case of a triggering of a bail-in and the resulting conversion or write-down.[35] In sum, it is argued that ensuring creditors losses is an appropriate way to enhance market discipline (Gleeson, 2014).

Box No. 1: Systemic implications of bail-in: a brief survey of the economic literature

The economic literature has extensively studied the long-standing question of how to solve the TBTF problem. The starting point is the GFC, which forced governments to choose between the undesirable alternatives of either bailing out a systemically important bank or allowing it to fail disruptively, with the result that the states intervened in financial markets, and became a major shareholder in many banks.

Morrison (2011) and Bernake (2016) underline that the most important costs of the TBTF problem are incurred in the form of distorted incentives that arise as a consequence of distortions to the capital markets, and to the choice of banks' scale and scope. They argue that it is impossible credibly to withdraw the TBTF policy, and, hence, that it should be managed to minimize the costs of these distortions. A strong role is envisaged for policies aimed at intervening on institutional design, the bank scope, and capital regulations.

[35] Under the EU resolution framework, the 'no creditor worse off' safeguard applies equally to the use of the debt write down tool, which means that the likely loss given default on bail-in is at least no worse than the loss given default on other resolution outcomes.

Calomiris (2011) and Philippon and Salord (2017) say that a resolution procedure that requires a minimum haircut on uninsured creditors is essential to promote financial stability. Furthermore, bail-ins are better than bail-outs, since they soften the negative impact of banks' insolvency on the economy at no cost for tax-payers. Using an agent- based model framework with no moral hazard to evaluate the economic and financial implications of bail-in, Klimek et al. (2015) argue that bail-ins are always more efficient than bail-outs. They find that for an economy characterized by low unemployment and high productivity the optimal crisis resolution with respect to financial stability and economic productivity is to close the ailing bank. For economies in recession with high unemployment, the bail-in tool provides the most efficient crisis resolution mechanism. Under no circumstances do taxpayer-funded bail-out schemes outperform bail-ins with private sector involvement.

Some studies observe that bail-outs can encourage bankers to take on more risk (Repullo, 2005) and discourage uninsured debt-holders from monitoring the conduct of the bank (Kaufman, 1991), thus leading to moral hazard behaviors. Bail-outs are also seen as a source of systemic risk, in that they give banks an incentive to pick correlated risks as to maximize bail-out gains in the case of a systemic crisis (Farhi and Tirole, 2012). However, other contributions have stressed that bail-outs might avert contagion risks by reducing the likelihood of fire sales and attenuate moral hazard, by increasing the charter value of banks and so inducing bankers to choose a safer portfolio (Acharya and Yorulmazer, 2008, and Cordella and Yeyati, 2003). Freixas (2000) outlines how in order to minimize the losses stemming from the liquidation of a large bank, and at the same time mitigating the moral hazard problem implicit in bail-outs, a mixed strategy would be preferable, in which banks are bail-outed not with certainty but only with a probability less than one (the so-called constructive ambiguity).

Some theoretical approaches have drawn attention to the potential disadvantages of bail-ins. Avgouleas and Goodhart (2015) contend that bail-ins might not be sufficient to reduce the threat of a systemic crisis, when bail-outs might be preferred. They stress that a bail-in mechanism adopted to recapitalize bank as going concern has some advantages and some disadvantages vis-a`-vis a bailout approach. Lower levels of moral hazard, better creditor monitoring, more protection for taxpayers and fairness in placing the burden, lower levels of concentration in the banking sector, improved ex ante behavior of bank management, less sovereign/bank debt 'doom-loop'. Among the latter: more contagious and pro-cyclical; more litigious; slower and more expensive as a process; requiring greater subsequent liquidity injections; leading to deterioration of governance; requiring higher funding costs to banks; providing a worse outlook for bank borrowers and worsening ex post outcomes. Similarly, Dewatripont (2014) discusses the potential pitfalls of bail-ins, concluding that bail-outs should not be excluded ex ante, rather it should complement bail-ins, especially in times of severe crises.

Some economists have modelled contagion effects across market participants (Caccioli et al. (2014); Cont and Schaanning (2017); and Farmer et al. (2020). In these studies, the behavior of banks is

driven by incentives (i.e. increase the return on equity), subject to constraints arising from regulation, contractual obligations, and internal risk limits. A bank is dominated by survival actions to meet these constraints to avoid failure rather than by normal-time activity. Examining the behavior of bank CDS spreads and stock prices, before and after the activation of the bail-in, around the date of the implementation of the BRRD in the EU, Schafer et al. (2016) find empirical evidence of a negative impact of bail-ins on subsequent bank returns, especially for the systemic banks and for the banks in peripheral Eurozone countries. This is due to the increase in funding costs, given the decreased chance of future bail-outs.

Evidence of real effects of the bail-in is provided by Beck et al. (2017), who investigates the reaction of banks exposed as credit suppliers to a bail-ined bank, and find that the banks more exposed cut back more on credit granted to non-financial firms. Taken together these studies show that bail-in increases the cost of debt, due to the shift in the burden of bank failures from tax-payers to debt-holders. Kleinnijenhuis et al. (2021) stress that banks seek to avoid default by aiming to full contractual obligations and comply with regulatory and market-based constraints. They model the interaction between funding contagion, overlapping portfolio contagion and exposure loss contagion in a multi-layered financial system consisting of banks and non-banks. In this context, they find that: financial stability hinges on bail-in design; bail-ins could be a credible tool for resolving failing systemic banks in system-wide crises, only if bail-in is well designed; a crisis-proof bail-in involves an early bail-in, a strong recapitalization and fair conversion rates; an ill-designed bail-in amplifies contagious shocks substantially more than a well-designed one.

Huser et al. (2017) evaluate the systemic consequences of bail-in in the European Union, drawing on a calibrated multi-layered network model of bank debt and equity cross holdings. On this basis, the bail-in of a bank can be simulated to identify the direct contagion risk to the other banks in the network. They find that there is no direct contagion to creditor banks. Spill-overs also tend to be small due to low levels of securities cross-holdings in the interbank network. They also quantify the impact of a bail-in on the different liability holders. In the baseline scenario, shareholders and subordinated creditors are affected by the bail-in, senior unsecured creditors in 75% of the cases.

The conceptual literature that critically evaluates some key aspects of the bail-in design includes the contributions of Zhou et al. (2012), Conlon and Cotter (2014), Sommer (2014), and Persaud (2014). They all stress the importance of an adequate design of the regulatory framework underpinning the application of such a tool. In this context, they stress that the triggers for bail-in powers should be consistent with those used for other resolution tools, and the need to impose minimum requirements on banks for issuing unsecured debt, in order to forestall potential runs by short-term creditors and avert a downward share prices spiral. Similarly, Anderson (2011) also argues that an effective bail-in process requires a careful design of the underlying regulatory framework, especially as regards the allocation of ownership and control rights among the investors involved in the recapitalization.

6. Minimum conditions for an efficient bail-in regime

6.1 The credibility of a bail-in regime

The economic literature points out that a key condition for an efficient application of a resolution tool refers to the careful design of its regulatory framework.[36] In the case of the bail-in, a clear and coherent legal framework is essential, and needs to establish an appropriate balance between the rights of private stakeholders and the public policy interest in preserving financial stability. This legal certainty acts as a precondition for the credibility of the bail-in regime, particularly in a cross-border context.

The involvement of the private sector may occur either as part of a resolution that leads to the closure of the bank in distress (gone-concern basis) or under a regime that allows the failing bank to remain open through and after resolution (going concern basis, or open–bank bail-in). [37] Regardless of the legal form in which the bail-in tool can be framed, it is necessary that the losses of the failing bank be allocated precisely to the bank's investors. This because bail-in provisions in essence ensure that a pre-planned contract replaces the bankruptcy process, giving greater certainty as regards the amount of funds able to cover bank losses (Avgouleas and Goodhart, 2015). In this context, debt restructuring ideally would not be subject to creditors' approval, but a NCWO test is introduced to safeguard creditors and shareholders' interests.

The bail-in regime may reach more efficient outcomes than a regime based upon government guarantees and bail-outs, if investors who perceive that bank capital instruments have become more risky are in a condition to decide accordingly. This means that bail-in may not produce the pro-cyclical effects outlined by some economists, [38] if investors can calculate and price correctly

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[36] For these strands of literature, see: Pennacchi (2010); Calomiris and Herring (2012); Armour (2014); Sommer (2014); Avgouleas and Goodhart (2014); Martynova and Perotti (2015); and Philippon and Salord (2017).

[37] The private sector can be involved either by bailing-in parts of the liabilities linked to the sold or transferred operations and sending the original bank into liquidation (the US model), or by fully bailing-in investors in order to achieve a sustainable capital structure for the original legal entity (the EU approach). For more details on the US and the EU bail-in regimes, see infra Box no. 2 and the references there quoted.

[38] Lewrick et al. (2019) have studied the pricing of senior bail-in bonds to evaluate the incentives of investors in monitoring banks and pricing bail-in risk. They find that investors price bail-in risk pro-cyclically and this has implications for the design of bail-in regimes. Yet it also implies weaker market discipline on these banks' risk-taking. They say that the flipside of this behaviour is that a tightening in market conditions can trigger a significant rise in the bail-in risk premium, even in the absence of any changes in the issuer's underlying credit risk. Such an increase would push up the banks' cost of funding and, if large enough, could weigh on riskier issuers' ability to roll over their bail-

the bail-in risk, that is the default probabilities, the exposures at default, and the associated loss given default, so that their actual results do not diverge materially from their ex ante expectations. In this case, investors in financial instruments subject to bail-in will not be discouraged and will continue funding other banks. If investors make mistakes, risk premiums are distorted, and the market discipline may send wrong incentives, with abrupt adjustments across markets.

In order to achieve this outcome, it is important that the resolution framework should not add an additional layer of uncertainty, which comes on top of information problems investors naturally face (Gorton, 2009; ICMA, 2017; and Troger, 2018).

Furthermore, bail-in can limit bank runs, and contagion, if it is a credible. For this reason, it is necessary to ensure that the banks have a sufficient amount of bail-inable liabilities, to achieve the internal recapitalization in an orderly, effective and timely manner.[39] This would help reassure the markets that a bail-in would be sufficient to recapitalize the distressed bank, thus forestalling potential runs by short-term creditors and avert a downward price spiral. [40]

Such instruments could have an impact on banks' financial structure and business model, since they impose the creation and distribution of certain liabilities, thus complicating the balance between rules designed to protect investors and incentives of banks to sell more risky instruments. There could be an increase in the funding costs of banks. However, with a rising proportion of bank creditors at risk from bank failure, there should be a greater benefit in terms of lower funding costs from a safer overall portfolio structure. This because one of the fundamental rationales of an

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in eligible debt at a palatable price. This pro-cyclicality highlights the importance of calibrating bail-in regimes conservatively and encouraging banks to issue, in good times, large amounts of bail-in debt across a range of long-term maturities.

[39] This is exactly the reason for which the BRRD mandates a minimum requirement of own funds and eligible liabilities (MREL) on the EU banks. The level of the MREL for each bank is set by authorities, depending on size, complexity, interconnectedness, and risk profile of each bank, according to harmonized guidelines issued by the European Banking Authority (EBA). A similar tool, called TLAC (Total Loss Absorbing Capacity) has been established by the FSB since 2019, for the global systemically important financial institutions (G-SIFIs).

[40] In order to avoid a situation whereby the bail-in is triggered, and the cushion of the bail-inable liabilities is not available, it is needed that they enter into force simultaneously. In this respect, some problems have arisen in the EU: when the BRRD came into force, the bail-in became immediately operative, whereas the completion of the MREL did not.

efficient bail-in regime is that at risk creditors will have ex ante incentives to encourage bank managers to pursue prudent policies, in contrast to more risk-seeking shareholders.

6.2 Conditions for efficiency and policy objectives

The efficiency of the bail-in regime depends on the characteristics of debt holders and their ability to bear losses (Gotz and Troger, 2016). In order to avoid that the bail-in, once implemented, has destabilizing effects on the markets, the capital instruments subject to bail-in are to be held outside the banking sector, by adequately equipped investors, such as insurance companies, pension funds, high-net worth individuals, and hedge funds. [41] Under these conditions, the failure of a bank may not be the trigger factor for a systemic crisis. If investors who do not possess the required loss-bearing and risk-management capacities are allowed to hold bail-inable capital instruments, in the case of a crisis the likelihood of a bail-out increases, thus undermining the credibility of the bail-in regime itself (Troger, 2018).

The optimal environment for a bail-in to work would be in circumstances where a bank, even a large one, fails for idiosyncratic reasons and the rest of the financial system remains untouched. In the case of exogenous shocks affecting simultaneously a number of banks or financial institutions, the viability of the bail-in mechanism would be determined by the amount of cross-holdings of senior debt across banks.[42] Zhou et al. (2012) outline that the triggers for bail-in powers should be consistent with those used for other resolution tools. They should be set at the point when a firm has breached the regulatory minima, but before it became balance-sheet insolvent. To make bail-in a transparent tool, its scope should be limited to i) elimination of existing equity shares as a precondition for bail-in; and ii) conversion and haircut to subordinated and unsecured senior debt. This means that debt restructuring under a bail-in should take into account the order of priorities applicable in a liquidation. Furthermore, a well-designated bail-in instrument needs to define a clear-cut, difficult to game trigger event (e.g., a common equity tier

[41] Along the same line of argument, according to Avgouleas and Goodhart (2015), and Hellwig (2021), since the objective of the bail-in is to transfer part of the losses incurred by a bank to its senior creditors, if these senior creditors are other banks, the likely outcome is to transmit contagion across the banking system. In this respect, a properly designed bail-in regime would exclude from its scope deposits, transactions payments swaps, etc., which transfer losses between market participants. Only in the case the bail-in debt is owned predominantly by end investors, the bail-in could substantially reduce systemic risk.

[42] This is why regulators, especially in the Basel III framework, tend to penalize the inter-bank holdings of debt, and in particular the holdings of other banks' capital instruments.

1 ratio), has to make bail-inable capital instruments identifiable, and has to allow predicting the consequences of the implementation of the tool, i.e., haircuts and conversions should occur automatically with no discretion (Troger, 2018).

Predicting the precise conditions and circumstances for a bank's failure and the actions to be activated by the resolutions authorities is tied to the elements of the so-called Knightian uncertainty, whose distinctive features signal a number of elements and aspects of the real world, include those of the banking crises, which are not susceptible to be measured with precision. [43] A consistent strand of the literature has raised arguments in favor of an implementation of resolution tools with an acceptable level of discretion, within a strategy pursued on a case-by-case basis by the resolution authority (Zhou et al., 2012; Avgouleas and Goodhart, 2014; and Hellwig, 2021). This means that there exists a tension that cannot be entirely eliminated between ex post efficient outcomes and the inefficient ex ante effects of uncertainty, which may undermine the objectives of a bail-in regime, as an adequate mechanism for ensuring that the private sector bear the costs (or part of them) of a banking crisis.[44]

The discretionary elements in the resolution framework should be limited to the necessary, in order to shield the investors in bail-inable instruments from the negative consequences of the inevitable unpredictability of bank resolutions outcomes. For example, Zhou et al. (2012) recognize the importance to minimize the uncertainty generated by a discretionary use of bail-in powers, in order to avoid surprising and negative effects across markets participants.

In sum, the usefulness of a bail-in regime lies in the fact that by writing off debt it improves the creditworthiness of the bank concerned to a stage where it can access the money markets and raise liquidity. In order to achieve these objective, providers of liquidity must be left without doubt

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[43] Knight (1921) states that risk and uncertainty are two different categories, because in the former the distribution of the outcomes of a group of instances is known, while this is not true in the case of uncertainty; uncertainty gets in when not all risks are measurable or even knowable. In his view, the complexity of modern finance may imply that risks spread out through the entire system via a number of channels not susceptible of being measured. If we are not in a position to perfectly calculate or assign a probability distribution to the future states of the world, we are not dealing with risk, but with 'Knightian' uncertainty.

[44] According to Troger (2018), more predictability can be achieved by defining a clear trigger event, independent of the outcomes of the resolution. If the primary goal of bail-in is to induce market discipline exercised by sophisticated investors, the capital layer that absorbs losses does not have to be perfectly adjusted to an individual institution's precise recapitalization needs in resolution. In this way, the scope of bail-in at non-viable banks could be determined ex ante with reasonable certainty, regardless of the strategy authorities decide in an actual resolution event.

that the write-off is immediately effective and cannot be credibly challenged. In a situation where the bank and all its relevant creditors are located in the same jurisdiction, these conditions can be achieved easily. This is not the case for a large bank, whose failure would give rise to significant systemic concerns. In such a situation, a large portion of the bank's senior debt is likely to be governed by laws and contracts other than those of their place of incorporation.

7. Some examples from the EU resolution framework

In the EU the financial architecture for resolution, crisis management and supervision, emerged since the GFC, includes a multi-polar decision making structure,[45] and a multi-layered system of applicable rules and standards, at a supranational and national levels.[46] In the case of the bail-in, the EU regime appears to be highly prescriptive, but this does not necessarily imply hard rules prescribing with precision the outcomes of the resolution actions.[47] One possible explaining factor points towards the degree of complexity of the framework itself, which includes a large number of exceptions, counter-exceptions, and restrictions, which require the use of a significant amount of discretion in the decisions to take by a multitude of responsible authorities. Moreover, the concrete implementation of each rule or standard may depend on the specific circumstances of each case. This means that - once combined with the necessity to coordinate the several layers of authorities and private parties at both the EU and national level - the involved assessments are difficult to make and are subject to varying standards and approaches.

In the analysis of the EU regulatory framework, one has to take into account that in the attempt to reduce as far as possible the space for political decisions, it has been entrusted all to technical bodies, which have to move within defined parameters. The point is the excessive rigidity of the whole process, which cannot be overcome without recourse to discretion and 'constructive

[45] For more details on the EU financial architecture, see: Pisani-Ferri et al. (2012); Goyal et al. (2013); Pagano (2016); and Philippon and Salord (2017).

[46] In the EU, the BRRD and the SRMR provide the fundamentals for a harmonized system for crisis management and resolution, at least for the largest and systemic EU banks. The EU framework still misses an efficient and integrated system for the management of crises of small and medium-sized banks. On this point, see Majnoni et al. (2021).

[47] It is not uncommon that a detailed legal framework is accompanied by elements of discretional choices, and even standardized operational procedures leave substantial room to the relevant official decision-makers for ex post variation of the key decisions, and this tends to put in question its automaticity and uniformity of application (Hadjiemmuil, 2015).

ambiguity'. This is difficult to rely on entities other than those with political steering powers, which are responsible for the decision on the use of public resources and can act through the law.

The sub-paragraphs below draw some examples from the EU resolution framework where the minimum conditions for an efficient bail-in regime, as outlined previously, might not be achieved. They belong to the following areas: prediction of resolution outcomes by investors; preconditions for resolution; selection from the resolution tools; exemption of liabilities from bail-in; restrictions on holdings of bail-in capital.

7.1 Prediction of resolution outcomes

The EU and national authorities exercise their powers to pursue the goals established by the BRRD, in order to facilitate a solution considered preferable in the light of a notion of 'public interest', when compared with the outcomes of a normal insolvency procedure. [48]

In the application of the bail-in, investors have to base their risk assessments on the administrative practices followed by the different competent authorities. In order to ensure an adequate accuracy of any calculation on the implied default probabilities and loss given default, they have to know who makes the final decision in each step of the procedure. This situation might add significant uncertainty in assessing the timing and the impact of a bank's resolution. The predictability of the resolution outcomes might be impeded in case the distribution of competences seems to be not entirely consistent.[49]

Another source of uncertainty refers to the issue of the pricing of the newly issued bail-inable capital instruments. The high degree of discretion embedded in the regulation renders the level of the risk associated with these instruments (and the related price) almost unpredictable. Any adjustment of the MREL framework affects the pricing of already issued securities and adds another layer of complexity to the existing rules.

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[48] These goals include: i) ensuring the continuity of critical functions; ii) avoiding significant adverse effects on financial stability; iii) avoiding or minimizing recourse to public funds and tax-payers' money; iv) and protecting deposits, investments, and other clients' funds. See BRRD, article 31. See: Cassese (2017); Ventoruzzo and Sandrelli (2020).

[49] For instance, the EU Commission, primarily responsible for competition, has the power to assess both the compatibility of public intervention with the State aid rules, and the respect of the BRRD requirements referring to financial stability. Additional tension can also emerge between national governments, which are inclined to provide public support to local banks and the compliance with the State aid rules determined at the EU level (Troger, 2018; and Ventoruzzo and Sandrelli, 2020).

7.2 Triggers for resolution

The condition for the activation of the bail-in is that a formal resolution proceeding is triggered by the resolution authority, who decides based upon three criteria.[50] Each of these criteria requires complex supervisory or resolution actions, whose results cannot be calculated with precision ex ante. In this context, the prediction of the outcomes by investors and markets could be hampered. Enhanced certainty can be achieved over time, if there is a reasonable number of cases where the application of the criteria has been done consistently. This can turn out to be particularly difficult in the EU, given the overlap of competences among authorities and the lack of transparency for no-action decisions. Therefore, there could be the risk that this regulatory framework, even with more stringent regulations, could not produce a reduction of the forbearance.[51]

Under the first condition for resolution, the EU framework specifies the circumstances under which the assessment for a bank to be failing or likely to fail is justified.[52] Besides the classical triggers for insolvency, the EU framework states that a bank's failure can occur if the violations of prudential banking regulations, particularly those concerning the own funds requirements, justify the withdrawal of the authorization, or an extraordinary public support is needed. In these cases, uncertainty remains important, since these triggers deviate from the established understanding of a bank's default, which can shape market expectations, given that they cannot be drawn from the practices developed in the national insolvency procedures.[53]

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[50] In the EU framework, these three criteria are the following: i) the bank is failing or is likely to fail; ii) there is no (private or public) alternative to the bank's failure; iii) resolution pursues the public interest better than an ordinary insolvency procedure. Article 32 of the BRRD provides the detailed rules governing these conditions.

[51] Avgouleas and Goodhart (2015) doubt that the adoption of bail-in regimes would lead to earlier regulatory interventions than under the bail-out regimes. They point out that authorities have the incentives to delay intervention because of higher legal risks in the case losses are imposed on bank creditors, which is not present in bail-out scenarios. These legal concerns could unduly delay resolution until the last possible minute. By then the liabilities needed to be written down could extend beyond the contract bail-inable debt and affects a wider range of creditors. There will be more parts to the negotiation and hence that may be more protracted proceedings.

[52] For an overview of the issues involved in such an assessment, see the following: Zhou et al. (2012); Wojcik (2016); and Busch et al. (2019).

[53] According to the BRRD, the classical insolvency triggers refer to a situation where there are objective elements to assess that in the near future: i) the assets of the bank will be less than its liabilities, or ii) the bank can be unable to pay its debts or liabilities as they fall due. Even for these classical triggers, there is an issue of uncertainty. These elements cannot be unequivocally determined especially under serious time constraints. The assessment of non-

These difficulties gain prominence, if one takes into account the exceptions defined in the EU law to the general principle that government support automatically triggers resolution. On the one hand, the EU framework requires that the public support (in various forms[54]) to an ailing bank be extended to avert a systemic crisis. On the other, these measures have to be precautionary and temporary, finalized to assist solvent banks, and are not supposed to offset losses the bank has incurred or is likely to incur in the near future. Things become even more complicated, if one takes into consideration that these precautionary recapitalizations are allowed to cover capital shortfalls revealed in hypothetical adverse scenarios used in the EU or national stress test exercises. This means that the exception as defined in the EU law requires to assess the systemic implications of a hypothetical failure of a bank that is still going-concern. On the contrary, only private funds can cover shortfalls emerging under the baseline scenario.[55]

The identification of the banks for which government support without minimum bail-in is available is not an easy task for investors seeking to assess the risk inherent in an investment in bank's bail-inable capital instruments. For this purpose, investors have to understand when a failure of a bank has the potential to determine a systemic crisis. This cannot be derived by the SSM designation of a bank as significant. A more granular analysis is needed to look at the position of each bank within a Member state, or the European or the global economy. The issue here is that market participants usually are not in a position to assess with precision all these elements, since they do not have all the necessary information.

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viability is extremely difficult, and is very discretionary, given that these resolutions conditions require the knowledge of elements not publicly available, such as the key data and the relevant methodologies used by authorities and the specification of the concept of the 'near future' referred to in the law and used in the actual cases. For these considerations, see Troger, 2018.

[54] The BRRD refers to the following forms: a state guarantee to: i) liquidity facilities by central banks; or II) newly issued liabilities; iii) an injection of own funds or purchase of capital instruments, with no advantage for the bank.

[55] Moreover, public support must comply with State aid rules at both the EU and national levels. In this respect, a very important condition concerns the so-called burden sharing, i.e., the need to access public sources that existing eligible shareholders or creditors contribute to the financial effort to restore the bank's health. More specifically, resolution funds can be accessed only after an amount equal to 8 per cent of liabilities has been covered through write-downs or conversions of liabilities and, in any case, remaining losses can be covered only to a maximum of 5 per cent of the bank's liabilities. See the articles 37, 45, 56, 57, 58 of the BRRD.

7.3 Selection of the resolution tools

In the EU framework, once resolution has been triggered, the activation of the bail-in is not automatic. Resolution authorities may choose the resolution tools that are more coherent with the resolution strategy adopted for each individual bank from a set of tools defined by law.[56] This means that even in a resolution the involvement of the private sector is not mandatory, given that the resolution authorities may opt to manage the crisis applying the other tools.[57] In this respect, resolution authorities have a significant level of flexibility as to the choice of the tool to use in a crisis scenario.

Investors who seek to anticipate the outcomes of a resolution face a wide array of possible choices not only on the levels of the selection of the appropriate strategy and tools, but also on the level of their implementation. This prediction is even more complicated given that the EU regime only partly supra-nationalises the relevant decisions, and the division of responsibilities between and within each layer foresees a number of overlapping competences and interests in designing and implementing rules and procedures. Accordingly, the outcomes of a resolution may vary to a certain degree as a function of the level of the decision-maker. In this context, the lack of the minimum (theoretical) conditions for an efficient bail-in regime (legal certainty, and prediction of outcomes by investors) matters, given that the degrees of discretion available to authorities may lead to diverging outcomes, thus increasing uncertainties for market participants.

7.4 Liabilities exempt from bail-in

In the EU resolution framework, there are liabilities that are either exempt from bail-in directly by law, or are excluded in exceptional circumstances at the discretion of the resolution

[56] The resolution tools foreseen in the BRRD (article 37) are the following: the sale of business tool; the bridge institution tool; the asset separation tool; the bail-in tool. Resolution authorities may apply the resolution tools individually or in any combination. In the US, the Federal Deposit Insurance Corporation (FDIC), which leads the special resolution regime created by the DFA has also broad discretionary powers in selecting the appropriate resolution tools. For an overview of the advantages and disadvantages of each specific tool, in the context of a compared analysis of the US toolbox, see: Zhou et al. (2012); Busch et al. (2019); and Ventoruzzo and Sandrelli (2020).

[57] The only constraint established in the BRRD (article 37.2) is that if the chosen resolution strategy leads to the involvement of creditors, AT1- and T2-instruments have to be written down or converted immediately, regardless of when the bail-in tool is applied.

authorities. In the first case,[58] their identification seems to be not straightforward, because some of the terms used require an interpretation and an in-depth knowledge of the bank's business model, organizational structure and investments decisions. The same holds for the liabilities excluded by the authorities.[59] It could be difficult to forecast, at the time of the investment, whether certain liabilities are distributed in a way that their bail-in would lead to run-like scenarios or impede the continuity of critical functions of the bank.[60]

These activities require a knowledge of the methodologies, and data, used by regulators and banks, which are not available to external actors. Moreover, many investors are not sophisticated enough to exercise such an informed monitoring function. These difficult predictions are relevant not only for those creditors who potentially benefit from the exceptions. Also other creditors, who are equally subject to bail-in, are in a position to bear additional costs, since granting an exception implies that the loss participation of other creditors increases. [61]

The degree of uncertainty stemming from the current regime of statutory or discretionary exceptions can be reduced. An approach aimed at limiting the bail-inable liabilities to a sufficiently thick layer of predetermined liabilities would reduce the uncertainty, facilitating the investors' predictions about the magnitude of the private sector involvement in a crisis. Under such a regime, only investors in these capital instruments would exert market discipline, because pending losses

[58] The liabilities excluded by law refer to: covered deposits; secured liabilities, including covered bonds and liabilities for hedging purposes; clients' assets and funds, held as a separate asset protected by the law; liabilities from a fiduciary relationship; liabilities towards third party financial institutions and payment or settlement systems, with a maturity of less than seven days; liabilities to commercial creditors, providing critical goods or services; liabilities towards employees for remuneration and benefits; liabilities to tax and social security authorities, preferred by law; and liabilities towards deposit guarantee systems, arising from contributions. See article 44.2 of the BRRD.

[59] The liabilities excluded at the discretion of the resolution authorities (article 44.3 of the BRRD) refer to the following situations and motives: practical impossibility of timely bail-in; continuity of critical functions; prevention of bank runs; avoiding destruction of value. Discretionary exemptions must comply with the no-creditor-worse-off (NCWO) principle, since any exemption of certain liabilities from possible haircuts might worse the position of other bail-inable creditors.

[60] Based upon the evidence suggested by the GFC, Gorton (2009) has explained that parallel bank-like runs can occur outside the traditional banking system in wholesale markets, triggered by sudden information regarding the misperceived risk-structure of certain asset classes.

[61] For a discussion of the rationale in favour of excluding certain types of liabilities from bail-in, and the related financial stability implications, see: Zhou et al. (2012); Avgouelas and Goodhart, 2014; Wojcik (2016); Philippon and Salord (2017); and Troger (2018).

were far more assessable. The gains in market discipline should over compensate the losses in additional monitoring and militate in favour of limiting the bail-in to a designated part of the liabilities side of the bank balance sheet (Gotz et al., 2017).

7.5 Restrictions on holdings of bail-in capital

The effect of the bail-in mechanism is to allocate some of the losses incurred by a bank to its uninsured creditors and shareholders. If they are other banks or financial institutions, then the likely effect of a bail-in implementation could be the transmission of contagion across the financial system. In other words, the application of bail-in should not spread instability from one bank to another, since this may trigger a systemic crisis. This is why the post-GFC prudential framework includes provisions aimed at deducting such investments from the banks' regulatory capital.

We have seen before that a properly designed bail-in regime minimizes this risk, by excluding from its scope the transactions types, which transmit losses between the financial institutions (deposits, transactions payments, swaps, etc.). Enhanced market discipline is pursued by imposing constraints on the demand side for bail-able capital instruments. Such investors should have the necessary loss bearing capacity, when their debt is written down; have the capacity to hold bank equity in the case of a conversion; understand and price correctly the risk of bail-in; and charge adequate risk premiums on the new capital instruments, thus exerting a significant monitoring activity on banks' behaviour. If these instruments are allocated to unsophisticated (retail) investors, market discipline could be reduced, with some consequences on the credibility of a bail-in regime. These considerations have offered arguments in favour of possible restrictions in the holdings of bail-inable instruments.

The economic literature has outlined some qualifications of the suitable investors, who should be among sophisticated financial institutions, outside the banking sector, and with no asset-liability mismatch.[62] If bank capital is held by 'wrong investors' the private sector involvement may produce unintended consequences, which in turn may induce decision makers to use the

[62] Gotz and Troger (2016) have highlighted that a bail-in of debt holders becomes especially problematic if the debt holders are households or other types of retail investors. So, they argue that bail-in is most effective if such debts holders are (i) sophisticated investors which are (ii) active outside the banking sector and (iii) are not subject to an asset-liability mismatch due to their investment strategy. To this end, in their view, supervisors should continuously gather information on the owners of banks' bail-inable debt and monitor the ownership structure to assess whether debt holders satisfy the above-mentioned three criteria.

discretion built in the regulatory framework to restrict the application of the bail-in tool, making the involvement of the private sector essentially a politically driven event.

In general, the question of the desirable nature of holders of bail-inable instruments is difficult to solve. As noted above, retail investors are not suitable for reasons of poor monitoring aptitude and risk of panic. Other banks are to be excluded for reasons of contagion. The point is that other financial institutions, other than banks, can also give rise to episodes of systemic contagion: the notion cannot be restricted to the banking system, also because banks, insurance companies and asset managers are often closely interconnected, Super-rich individuals and sovereign wealth funds remain. These considerations are not an argument against the imposition of bail-inable securities, but against an excessive faith in the ability of this instrument to resolve the classic trade-offs related to bank defaults (moral hazard and the burden on public finances on the one hand, systemic risk on the other).

Box No. 2: Some aspects of the US and EU bail-in regimes[63]

In the US, until 2010, insolvent depository banks, were (and are) subject to a special federal administrative procedure regulated by the Federal Deposit Insurance Act (FDIA). Non-bank financial companies, including bank holding companies, were subject to ordinary (court-based) insolvency proceedings under the US Bankruptcy Code. In 2010, the Dodd-Frank ACT (DFA) introduced a new administrative option (the 'orderly liquidation authority', OLA) for non-bank financial companies recognized as systemically important financial institutions. As with depository banks, the DFA grants FDIC special powers to assist a failing institution.

The US resolution authority is assigned a significant amount of discretion in the application of the general principles concerning the equal treatment of creditors and the pecking order, in the event of both a bail-in and other resolution tools. In both contexts, resolution is a procedure managed by an administrative authority (the SRB and the national resolution authorities in the EU; the FDIC in the US), as opposed to a bankruptcy court.

As to the scope of application, the EU includes all banks and investment firms, as well as financial holdings companies, while the OLA carves the insured depository institutions out. As to resolution authorities, the US shows a streamlined structure, where the FDIC operates as single federal resolution authority. The complex EU framework reflects a fragmented institutional context, where significant banks are supervised at the ECB level, while the others at the national level. Another

[63] This Box is derived mainly form the following papers: Sommer (2014); Ringe (2016); Avgouelas and Goodhart (2015); and Ventoruzzo and Sandrelli (2020).

difference concerns the resolvability at a group level and the related adoption of the single point of entry (SPE) vs the multiple point of entry (MPE) approach. The MPE strategy is the rule in the EU, where a holding company may be resolved even if it does not meet the resolution requirements, if one or more subsidiaries do meet them. The US adopts largely a SPE model, where the resolution triggers are checked at the holding company or at the subsidiary level.

The bail-in is different in scope in the two systems. In the EU, an 'open bank' bail-in is theoretically practicable. Resolution authorities may apply the bail-in tool to recapitalize a failing bank to restore its long-term viability. In the US, the bail-in tool may only be used in a gone-concern situation, possible coupled with the sale of business or assets to a bridge institution or a third party, where the resolved bank ceases to exist ('closed bank' bail-in).

Finally, in the US, the resolution mechanism interplays with the federal insolvency rules, both ordinary (the Bankruptcy Code) and special (the FDIA). In the EU, since the winding-up and liquidation of banks are not harmonized, a European resolution decision reflects the intersection with different national rules, and this situation may determine a number of potentially divergent outcomes.

8. Does bail-in end the too-big-to-fail problem?

Since its inception, the bail-in has been at the center of academic and professional disputes as regards its effectiveness to mitigate the systemic risks associated with disorderly liquidations. While bail-in has proved to be relatively successful in dealing with the failure of small and medium-sized banks, its ability to handle system-wide crises has not been tested. In this respect, its ability to end the TBTF problem needs to be confirmed. Accordingly, the issue whether it may replace the government bail-outs, dropping out the implicit governments' guarantees in the price of large banks' capital, should be assessed carefully.

In general, the post-GFC bail-in approach seems to be based on the assumption that banks fail individually, one at a time. On the contrary, the historical experience tells us that bank failures are rarely pure idiosyncratic events, since they tend to happen simultaneously, essentially when there is a wider economic distress. In the case of a system-wide crisis, it could be unrealistic to believe that bail-in can be activated on a magnitude that allows absorbing the losses, or ensuring the recapitalization needs of all the involved banks simultaneously. In particular, there is the risk that imposing haircuts on a large bank's creditors cannot preserve financial stability, but rather it can accelerate a systemic panic. The situation is even more complicated since, in this scenario, alternative private sources of financing tend to be scarce. Similar arguments hold also in the case

of an individual failure affecting any of the largest and systemic banks. [64] According to some authors, bail-in could be used to recapitalize even a large bank, but only if it has failed due to its own actions and not due to a generalized systemic crisis, i.e., its failure is clearly idiosyncratic; otherwise, a flight of creditors from one bank to others may be uncontainable (Avgouleas and Goodhart, 2015). [65]

These arguments have been at the centre of the decisions taken in the post-GFC years by the competent authorities when they have been faced with the issue to apply (or more often not to apply) the bail-in tool (for an extensive review of the several cases incurred in the EU see Ventoruzzo and Sandrelli, 2020). The last episode in order of time has been the crisis of the Credit Swiss in 2023: it shows all the difficulties and problems that have to be dealt with in the case of a possible application of the bail-in to a large and systemic bank.

The problems of Credit Swiss were found in a range of business areas and in various risk types. In almost all cases, serious deficiencies in risk management played a role. FINMA's measures targeted these deficiencies and tightened up checks and controls. Despite some extensive adjustments over the years, the bank's executive bodies were unable to remedy the repeatedly identified deficiencies in the bank's organisation in a holistic and sustainable manner. The bank met the regulatory capital requirements. Even this capital adequacy situation was unable to contain or prevent the massive crisis of confidence. It also met the regulatory requirements for liquidity and held comfortable liquidity buffers in summer 2022. However, the loss of confidence in the bank led to very rapid and widespread liquidity outflows, which were exacerbated by digital means of communication (digital bank run) and ultimately brought the bank to the brink of insolvency.

During the resolution weekend, the Swiss authorities had considered 4 options to solve the crisis of the Credit Suisse. The first one was a bail-in resolution of the bank. The Swiss authority would have declared the point of non-viability and ordered restructuring and capital measures. This was a TBTF resolution option and had been prepared by the international crisis management

[64] For example, it could be questioned whether in the Banking Union the total amount of resources available on ex ante basis to all the deposit guarantee systems (DGS) and the single resolution fund (SRF) may be enough in the case of a crisis affecting one of the BU largest banks. These funds are clearly insufficient in the case of a system-wide banking crisis. For these calculations and assessment, see Hadjiemmanuil (2015).

[65] This holds above all if the concerned bank is a pure domestic bank, since in a cross-border context, the multiple layers of risks and costs associated with a cross-border resolution make the use of the bail-in highly uncertain in its outcomes.

group. But it would have required an emergency law to secure funding in resolution. The second option - a nationalization and temporary public sector ownership – was dismissed since it is not foreseen in the Swiss TBTF regime. The third option was an assisted merger of Credit Suisse with UBS. The fourth was a bankruptcy and activation of the Swiss emergency plan. In the end the option chosen was the merger which was considered as the least risky option. [66]

For the above considerations, the bail-in tool seems to be more viable in the case of a crisis affecting a bank whose dimension and risk profile could not give rise to systemic concerns. A successful bail-in recapitalization would require a quick restoration of market confidence, accurate evaluation of losses and successful restructuring of the bailed-in bank's operations. It could be very hard for regulators to secure all these prerequisites in the event of a systemic crisis. A complete replacement of the bail-out subsidy is very difficult to obtain, because the likelihood of a public bail-out and the related estimated value of the government guarantee are not the same for all banks nor invariant over time. In particular, they tend to increase with banks' size and with the deteriorating macroeconomic conditions.

We have learnt from history that in the case of a systemic crisis the decisions taken by governments to avoid any backstop to the financial system usually tends to aggravate the consequences of the crisis.[67] The resolution of a large and systemic bank would still require a credible fiscal backstop.[68] In this respect, it could be recalled that it is not always true that the interests of tax-payers are in all cases impaired by the governments interventions. Their indirect costs, in terms of reduced market discipline or enhanced moral hazard, have to be assessed against their indirect benefits, such as the economic and financial stabilizing effects from a large bank's rescue. Both costs and benefits cannot be measured with accuracy ex ante. The taxpayers'

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[66]. For more details on the crisis of Credit Suisse, see: Angeloni et al. (2024); and FINMA (2023).

[67] The tough policy stance of the Federal Reserve System in the run-up and during the Great Depression during the 1930s to allow monetary contractions also by allowing banks to fail has been one of the main contributing factor of the excessive severity and duration of the crisis. See, for example, Eichengreen (1992), and Romer (1993). The same can be stated for the systemic consequences of the GFC, given that the US authorities in 2008 decided to not activate a credible public backstop in the case of the failure of Lehman Brothers. On this last point, see De Bonis and Trapanese (2023), and the references there quoted.

[68] The EU framework for crisis management still misses a financial stability facility/exemption, aimed at overcoming the rigidities of the framework in the case exceptional circumstances threaten the EU financial stability. This feature, coupled with the absence of a true European deposit insurance system, makes the EU crisis management framework still incomplete. See Trapanese et al. (2024).

estimated losses are higher at the point of the crisis, but it is not uncommon that the investments of tax-payers in bank capital may be reversed overtime. The potential losses for the public participation in bank recapitalization may turn into substantial gains, as the economic conditions improve and the value of the bailed-out bank increases on the markets. [69]

9. Conclusions

The objectives of the post-GFC bail-in approach (enhancing market discipline, reducing moral hazard, and protecting public finance) can be achieved to the extent market participants can make informed predictions about the authorities' reaction function in a crisis, and foresee the risk of their capital instruments being written-off or converted with reasonable certainty.

The paper shows that in the case of the EU the bail-in is based upon a regulatory framework where the automaticity of the rules is complemented by a significant discretion. If these degrees of discretion are framed in a decision-making process based upon complex mechanisms, there could be uncertainties in the application of the bail-in and difficulties in the achievement of its original objectives. The build-up of high-quality financial instruments, ideally mainly in terms of subordinated debt (to avoid possible overlaps with capital requirements) to be bailed-in may contribute to enhance the predictability of who is supposed to bear the costs of an intervention, and help to solve the associated uncertainties.

From a functional perspective, the paper shows that the bail-in is supposed to work efficiently, if its implementation does not create the conditions for mounting threats to the stability of the financial system as a whole. In conclusion, the paper argues that bail-in should be considered as one of the elements of a comprehensive solution to the TBTF problem.

[69] For these considerations, see Laeven (2011); Hertig (2012); and Dewatripont (2014).

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