FINANCIAL CRISIS SIMULATION EXERCISES IN EUROPE AND CENTRAL ASIA: LESSONS LEARNED

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Aquiles A. Almans and Attila Csajbok
Table of Contents

Executive Summary 2

1. Introduction 4

2. Nature and purpose of CSEs 4

3. What makes a CSE successful? 7

4. Lessons learned 7
   4.1 Policy lessons 7
   4.2 Lessons for CSE design 14

ANNEX: Analyzing the action: statistics, metadata and slicing the scenario 17
Executive Summary

In this paper we summarize lessons learned from financial crisis simulation exercises (CSEs) conducted by the World Bank’s Financial Sector Advisory Centre (FinSAC) in eight countries in the Europe and Central Asia (ECA) region during 2012-15. Our CSE experience in the ECA region suggests that:

- With recovery and resolution planning and bail-in not yet very well developed in the region, the resolution of systemic banks almost always involves public money. Providing public funds for bank resolution is a major challenge, usually heavily loaded with politics and occasionally putting central bank independence to the test. The authorities are often not aware of how important, complex and resource-intensive is the task of assessing the alternative resolution options and their (fiscal) costs.

- Inter-authority Financial Stability Councils (FSCs) often suffer from an identity crisis, ultimately stemming from the fact that their mandate is frequently a mixture of crisis management and crisis prevention tasks. Well-functioning FSCs tend to have a narrow composition and a mandate more focused on crisis management.

- During our CSEs, other players typically tended not to actively involve central bank Financial Stability departments in the crisis management process. Their systemic perspective is essential in effectively managing a crisis, including assessing if and when stress reaches systemic proportions.

- Given widespread currency substitution and the prevalence of FX lending, most ECA country authorities need to be prepared to handle a twin (currency/banking) crisis. Some of them were not fully aware of the pitfalls of large-scale domestic liquidity provision in a situation when the currency is under speculative pressure. Others, most notably the ones with a history of FX reserve adequacy issues, were much more prepared to provide domestic liquidity only in a targeted manner (typically through FX swaps).

- The willingness to deploy monetary policy (changes in central bank interest rates) to fight a financial crisis was quite different among the countries and to some extent it seemed inversely related to exchange rate flexibility.

- Deposit guarantee funds (DGFs) in the ECA region typically follow a simple “pay-box” model. Our CSEs showed that they would benefit from specific ex ante liquidity arrangements (ideally repo lines from the central bank) and early notification of bank interventions. Even if they are a simple “pay-box”, the public may see them as a separate institution and their public communication should be consistent with that of the other players.

- Host supervisors should maintain continuous dialog with home supervisors so they know where to access crucial information in crisis periods. At the same time, they
should be prepared for home supervisors to be reluctant to share information if the parent bank is in trouble. The host-host dimension of supervisory information sharing can also be better utilized. The authorities should be aware that parent banks may not be willing or able to provide capital and liquidity to their subsidiaries, even if they did so in the past.

• It is very important that authorities in a crisis situation coordinate their respective communication with the public and try to “speak with one voice”. Ideally, authorities should have in place well-designed ex ante communication plans for crisis periods. In a twin (banking/currency) crisis, communication on the exchange rate should be consistent with the central bank’s actions, following the general principle of “do what you say and say what you do”. When it comes to FX intervention, however, a more low-profile communication strategy is advisable and certainly not immediately revealing intervention amounts to avoid being cornered by the market.

• Central banks should exhibit more “ownership” of financial sector cyber security issues, in particular in facilitating a solution to the coordination problem between banks in case one of them falls victim of a cyber-attack.
1. Introduction

Since its inception in 2012, the World Bank’s Vienna Financial Sector Advisory Centre (FinSAC) has conducted eight financial crisis simulation exercises (CSEs) in its client countries. CSEs quickly became popular in the region, requests for conducting these exercises arrived with increasing frequency. So far at least one CSE has been completed in each of the following countries (in alphabetical order): Albania, Armenia, Croatia, Kosovo, Macedonia, Moldova, Montenegro and Romania.

This paper summarizes the experience we gained during these exercises. After a brief discussion of how the CSEs were typically structured, we turn to the lessons learned on the effectiveness of existing crisis preparedness frameworks. It is important to note that all eight CSEs to date were in countries with banking supervision integrated within the central bank, therefore some of the lessons may not be applicable to countries where banking supervision is separate. In addition to the policy lessons, we also consider what has been learned about the design of the CSEs themselves which might guide how crisis simulations should be best structured in the future.

As the output of CSEs is confidential, we do not disclose country names when referring to particular lessons learned. Needless to say, not all lessons are characteristic of all countries; any particular CSE country exhibited only a subset of these features. Our selection of lessons is inevitably subjective. We just want to share those impressions that we, as organizers and facilitators of the CSEs found interesting and, at least to some extent, recurring across the simulations.

2. Nature and purpose of CSEs

CSEs are games of interaction among financial-sector decision-makers. Depending on the set-up of the CSE (national, intra-institutional or multi-jurisdictional) these decision-makers can be:

- national financial sector authorities (Minister of Finance, Central Bank Governor/Board, bank and non-bank supervisors, deposit insurance, etc.), and/or

- internal areas of any of those authorities (such as the Supervision, Financial Stability, Market Operations, etc. departments and the Governor/Board of a central bank), or

- financial sector authorities of different jurisdictions dealing with common issues (such as host supervisors of subsidiaries of a regional/global financial group and the group’s home supervisor).

1 See also the FinSAC CSE brochure for clients: [http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/12/18/000456286_20141218134641/Rendered/PDF/933380WP0Box3800Dec018020140PUBLIC0.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/12/18/000456286_20141218134641/Rendered/PDF/933380WP0Box3800Dec018020140PUBLIC0.pdf)
The eight CSEs conducted in ECA during 2012-2015 were all of the national type. As banking supervision in each of these eight countries happened to be integrated within the central bank, these national CSEs always had an intra-institutional element as well, in a sense that the central bank was represented at the very least by two separate playing teams: its top decision-makers (Governor/Board) and the Banking Supervision department.

A CSE is akin to a war game that simulates a series of shocks requiring actions and decisions by senior decision makers. While there are several alternative ways of simulating circumstances that demand critical decision-making, the World Bank has chosen to deliver “role-playing” exercises. In a role-playing exercise, the Control Team (consisting of World Bank staff and a group of local experts) creates a scenario that senior decision makers of public authorities and their core staff (grouped into the Playing Teams) must respond to. Even though the scope is specific to the client, CSEs generally cover and test the following components of crisis preparedness: the legal/regulatory framework, the operational arrangements, information sharing and coordination among relevant agencies, and communications between key stakeholders and with the public.

World Bank CSEs are structured as games of asymmetric information: Playing Teams, representing different decision-makers, receive both “public information” simultaneously available to all of them and assumed to be available to the general public as press articles, and “private information” in the form of messages from a large number of sources (staffs of participating teams, bankers, foreign authorities, politicians, journalists, etc.) to only some of them. Given asymmetric information, effective decisions (individually or collectively, depending on the legal framework) rely on participating teams appropriately sharing the information that they have, and their respective understandings of it.

The CSE scenario consists of a series of hypothetical events that the authorities must handle during the game. It takes the form of a sequence of emails and other messages (prepared in advance) which progressively reveal, over several hours or days, problems to be addressed by the participating decision-makers. In preparing for the CSE, World Bank staff and a group of locally appointed experts form the Control Team to construct an appropriate, relevant and plausible scenario for the specific country’s risk profile and to control the delivery of the Exercise. Generally, the scenario involves a number of parallel and interconnected storylines that gradually build up the distress in the financial system.

The nature and sequence of shocks is always unique to the country and depend on the characteristics and current risks of the financial system in question. For illustration, here we list some elements that were included in a simulation scenario:

i) sudden emergence of credit risk at one of the banks, emanating from large exposure to a corporate client, leading to its imminent insolvency;

ii) public communication in the light of a huge contingent macro risk (potential
sovereign default) in a neighboring country.

iii) managing a divestment procedure under time pressure and in the face of uncertainty;

iv) continuous erosion of liquidity in a large foreign-owned subsidiary, due to liquidity problems in the parent’s home market and increasing stigmatization of the subsidiary in the domestic market;

v) communication and coordination with a home supervisor under stress;

vi) resolution of a medium-sized bank with insufficient funds at the deposit insurance fund to fully compensate its depositors;

vii) banking sector problems spilling over to the non-bank financial sector (investment funds);

viii) public debt management impact of problems at a large investment fund (regular buyer of government securities);

ix) dealing with a cyber-attack, which has a potential to turn into a systemic event;

x) widespread bank deposit withdrawals (deposit run);

xi) requests for emergency liquidity assistance (ELA) by banks with insufficient collateral/solvency, but of systemic importance;

xii) sizeable depreciation of the domestic currency, due to contagion from the main trading partner and problems in the domestic banking system;

xiii) foreign currency liquidity problems at a systemic bank, resulting in a request for ELA in FX;

xiv) dealing with political pressures; and

xv) tackling requests from the press, keeping the public informed.

It is important to note that the scenario is dynamic. In other words, some pre-written e-mail messages may never be used and many others are typically created on the spot by the Control Team, as the responses of the players influence the turn of events. Practically, the Control team role plays a number of identities (such as commercial bank CEOs, parent banks, foreign supervisors, journalists, politicians, etc.) that the Playing Teams may interact with.

The output of the exercise is a series of dialogues reflecting the exchange of information, and the decisions derived from it. Since the interaction normally takes place exclusively in writing, it allows for a detailed analysis of the decision-making process (see the Annex on the evolving technology of processing and analyzing the information flow from our CSEs).

The main purpose of these games is “learning by doing”: practicing decision-making and information sharing under existing or proposed legal and operational arrangements (such as legal powers to order and enforce prompt corrective actions or resolve failed institutions,
limits and operational rules and procedures to grant ELA, etc.) to achieve and maintain readiness to act in a crisis or, more generally, in difficult circumstances.

These games frequently, but not always, can also deliver useful sub-products: a) identification of aspects of the legal and operational arrangements that could be improved, b) creating consensus behind proposed reforms, and c) creating local capacity to regularly run CSEs.

3. What makes a CSE successful?

The quality and potential impact of these games greatly depend on the way they are originated and structured. The ideal game is one in which all participating teams truly want to “play”, and in which the problems they are asked to deal with sound plausible to them. If some of the participating teams would rather not play but are required to do so by more influential participants; if executing the simulation derives from conditionality in an IFI program without strong client ownership; or if the game does not reflect scenarios the participants truly worry about, the resulting interactions are unlikely to be particularly revealing.

4. Lessons learned

In this section we give a detailed description of challenges in different institutional set-ups for crisis management that we found during our CSEs. Some of these policy lessons stem from institutional features characteristic of the ECA region (such as the prevalence of foreign parents, FX lending, etc.), however, most of the lessons are quite generic and potentially relevant for many emerging countries. Beside the policy lessons that may be interesting for stakeholder authorities, there are lessons that we as organizers of CSEs gained regarding how best to structure these simulation exercises. Most of our “lessons” are simply observations of the challenges that the authorities have to face in their respective institutional set-ups. However, in some cases we went a bit further and offered tentative recommendations, based on what we had seen working best. Importantly, all the eight CSEs took place in countries where banking supervision was within the central bank, therefore some of the lessons may not apply to countries where supervision is separate.

4.1 Policy lessons

**Limited progress with Recovery and Resolution Planning (RRP).** Although some of our CSE countries, notably the EU candidates, are in the process of establishing their resolution framework and getting it aligned with the EU’s Bank Recovery and Resolution Directive (BRRD), at the time of the CSEs this process was at best in its infancy. Recovery and, especially, resolution planning at this stage is far from being functional in these countries.
Private sector resolution tools, such as bail-in are virtually non-existent. Consequently, the need for state support and thus the involvement of politicians at this stage is still inevitable in the resolution of systemic banks, a feature that came out clearly in most of our CSEs.

**Providing public funds.** Given the general lack of RRP, resolving a systemic bank in our CSE countries usually involves the use of public money. As ex ante resolution funds are very rare in ECA countries, requests for the use of public financing for this purpose have budgetary implications (modifications of the annual budget) and, as such, require parliamentary approval. This may require too much time and in some periods (summer recess of the parliament) may even be impossible to provide in reasonable time. On a few occasions during our CSEs there were pressures on the central bank to use its own funds (reserves) for bank resolution. In one, the central bank actually followed this policy by itself, with the argument that politics in that country is so complicated that resolution of a systemic bank would never happen if it was left to parliamentary approval.

**Lack of preparedness to assess resolution costs.** Assessing the cost of different bank resolution options (liquidation, purchase and assumption, bridge bank, nationalization, etc.) is a key step in managing a banking crisis. In the absence of ex ante recovery and resolution plans (a salient feature of ECA countries), such an assessment typically has to be done under a strict time constraint. Our CSE experience suggests that the authorities in many cases underestimate the importance, the complexity and the resources necessary to do it quickly and properly. Assessment worked best when it was allocated ex ante to the central bank, as its access to individual bank data and its wider systemic perspective allowed for effective consideration of the macro-financial consequences of different resolution alternatives. The alternatives should then be discussed by the authorities (at the minimum, by the central bank and the ministry of finance), ideally within a Financial Stability Council (FSC), and the preferred alternatives presented to the government and, if necessary, to the parliament.

**Solvency as a hard constraint for liquidity assistance.** In many countries, legislation or central bank by-laws prevent the central bank from providing liquidity support to insolvent banks. But what if a systemic bank gets illiquid and insolvent? Does the hard solvency constraint in such a situation constitute a risk of escalating a systemic crisis? Our impression during the CSEs was that it certainly does, but perhaps more importantly, it also serves as a disciplining device to force politicians to act in a timely manner (to provide public funding). The typical first reaction from the government’s side when faced with problems in a systemic bank is to leave them to the central bank to cope with (“you supervised it – you solve it”) and defer any recourse to public funding as long as possible. A legal constraint on the central bank prohibiting liquidity support in the case of insolvency, with its potential consequences of systemic bank failure, may force the government to engage in good time to identify and eventually to provide the necessary funding for resolution. The central bank may want to keep the troubled systemic bank temporarily afloat to contain the risk of escalating a systemic crisis, but only as long as the insolvency constraint remains a “credible threat” to provoke action from politicians. In many of our CSEs, navigating this narrow path was a challenge for the central bank.
Financial Stability Councils – identity problems. In many of our ECA CSE countries a national FSC, consisting of the central bank, the ministry of finance and sometimes various other stakeholders (deposit insurance, securities market regulator, parliamentary committee, etc.), has been set up post-global financial crisis. Most of these are non-statutory, i.e. based on MOUs between the participating stakeholders, and are typically intended to be a coordination forum between stakeholders rather than a decision-making body. Existing FSC mandates often mix crisis management (such as bank resolution) with crisis prevention functions (micro- and macroprudential policies). In crisis management, with the high chance of eventual use of public funds, it is natural that the government (ministry of finance) gets involved and plays a crucial role. In contrast, in crisis prevention, where sometimes politically unpopular prudential measures have to be taken, the independent supervisor(s)/regulator(s) should play the leading role, with politics better kept at distance. This mixed identity of FSCs may lead to a situation that in “normal times”, when crisis prevention is in focus, the ministry does not find a relevant role for itself. Consequently, regular FSC meetings often become delegated to the staff level, happen less frequently or come to an end altogether. A mixed identity does not always help in crisis times either. This is when some of the FSC member authorities find out that they may be collectively held responsible for an apparent failure of crisis prevention, which is otherwise mainly the responsibility of the independent supervisor/regulator. We have come across situations when some (typically non-core) FSC members got openly frustrated by this blame-shifting and questioned the necessity of their participation in the FSC. Our CSE experience suggests that well-functioning national FSCs have both a narrow membership (central bank, ministry of finance, plus maybe deposit insurance) and a narrow statutory mandate (focusing on crisis management). Based on our CSEs, a particularly important and useful role for an FSC (at least until a designated resolution authority more in line with the BRRD is set up) would be to discuss alternative resolution options (and their respective costs, as assessed ideally by the central bank) for troubled systemic banks and make recommendations to the government regarding which to choose.

The role of Financial Stability departments in crisis management. In most of the countries where we conducted a CSE, the central bank had established a Financial Stability unit whose responsibility is to watch over the stability of the financial system as a whole, as opposed to that of individual banks (the traditional task of banking supervision). Our CSE experience suggests that there is a wide spectrum of country practices regarding to what extent the Financial Stability unit is integrated in the decision-making process. At the very least, Financial Stability departments tend to produce periodic Financial Stability Reviews (FSRs). FSRs assess, typically with a semi-annual or annual frequency, the evolution of systemic risk in a number of dimensions. FSRs tend to get discussed by the central bank’s supreme decision-making body (CB Board) and, in most countries, get published. Beyond the production of the FSR, Financial Stability units are typically responsible for top-down macro stress-testing. All of the central banks with whom we conducted a CSE had some form of a stress-testing framework covering at least credit risk, but often going further to cover liquidity and market risk as well. Macro stress-test results in many cases are published in the FSRs, but the CB Board may require more frequent or, if necessary, ad-hoc stress tests.
from the Financial Stability unit. In some central banks, Financial Stability units are expected to formulate explicit macroprudential policy suggestions to the CB Board, coordinated with microprudential policy (banking supervision) and monetary policy as appropriate. In some countries this takes place in dedicated Financial Stability (or “Macroprudential”) Committees within the central bank, where all relevant departments participate. In some of these committees the Board is represented, usually by the Deputy Governor whose portfolio includes the Financial Stability unit. Such committees are typically advisory in nature and facilitate staff-level coordination, responsibility for policy making decisions remains with the CB Board.

Most of these functions of Financial Stability units serve the purpose of crisis prevention. When it comes to crisis management, especially while the focus is on individual banks, Banking Supervision naturally plays the main role and the potential interventions of the Financial Stability unit are more limited. Nevertheless, our CSE experience suggests that Financial Stability may get involved in a number of ways. First, as providers of the stress-testing framework they may receive requests from the CB Board (or banking supervision directly) about the resilience of certain banks or the system as a whole. Second, a typical request to Financial Stability units during a crisis is to assess whether the crisis has already reached systemic proportions (which may be a formal condition to trigger certain crisis protocols or may be of key importance to secure political support for the use of public funds). In certain countries the CSEs revealed some ambiguity as to whose task this assessment is. Third, if a banking crisis threatens to turn into a currency crisis (or vice versa) coordination between banking supervision, (FX) market operations and monetary policy becomes crucial. Financial Stability units, having some perspectives on all of these otherwise distinct areas, are ideal interlocutors in such situations. Although all these roles for Financial Stability units may come up here and there, our general impression during the ECA CSEs was that other players typically do not tend to actively involve Financial Stability in the crisis management process. However, in a particular experience, we came across a Financial Stability unit which was the de facto coordinator of the crisis management effort within the central bank, acting as a hub of information exchange between the different departments, and effectively preparing policy decisions for the CB Board.

Declaring a crisis as systemic. The CSEs highlighted the importance of the decision on whether a crisis has reached systemic proportions. In a few cases, “a systemic financial crisis” was a formal condition for access to public funds for crisis management purposes. In other cases, although it was not a formal condition, the declaration by the central bank or by the FSC that the crisis is systemic, was deemed to greatly increase the chance of politicians (the parliament) finally agreeing to provide public support. Yet, even if the importance of the declaration was clear in many cases, the practical implementation was often problematic. In some cases, national FSCs are endowed with the formal responsibility of declaring a systemic financial crisis. However, being high-level committees, national FSCs obviously cannot perform the necessary assessment by themselves. Typically, it is left to central bank staff to come up with an assessment and arguments regarding the systemic nature of the crisis. On at least one occasion this has led to some wrangling within the central
bank between Banking Supervision and Financial Stability as to whose task it is to do such an assessment, each trying to pass the responsibility on the grounds of lack of analytical capacity and lack of data, respectively. In our view, the optimal set-up is when the Financial Stability department takes the lead, but with requisite input from other relevant central bank departments, ideally via an internal Financial Stability (or Macroprudential) Committee. This makes it possible that vital information possessed typically by Banking Supervision, Market Operations or Payments Systems do not get lost and that these departments also bear ownership and responsibility for advice on the systemic nature of the crisis. This advice (and the supporting arguments) in turn should be endorsed by the CB Board and effectively voiced at the national FSC, which in many cases makes the formal declaration. As to the analytical tools necessary to underpin the CB staff’s advice, methods to identify domestic systemically important banks (D-SIBs) were in place in almost every country where we conducted a CSE. However, a crisis does not have to directly involve a D-SIB to qualify as a systemic crisis. Apart from D-SIB identification and stress-testing, other quantitative analytical tools of systemic risk monitoring, especially financial stress indices utilizing high-frequency (daily or weekly) financial market data were much less widespread, making the assessment based largely on judgment.

**Targeted liquidity provision in a twin (currency/banking) crisis.** Widespread currency substitution and FX lending is a salient feature of the financial systems in ECA countries. Consequently, a sizeable depreciation pressure on the domestic currency was a recurring motive in the scenarios of our CSEs in these countries. Our experience suggests that the authorities in general are aware that it is not enough to minimize (e.g. through regulation) the open FX position of the banking system if there is maturity mismatch between FX assets and liabilities. They recognize that they can find themselves in a situation (quite typical in a number of more advanced countries in 2008-2009) where FX liquidity becomes scarce and the central bank has to provide not only domestic, but foreign currency liquidity as well. In the absence of FX swap lines from major advanced country central banks, the ultimate constraint to such liquidity support is the size of the central bank’s FX reserves. Given this constraint, it is important that FX liquidity provision is done by the central bank directly and in a targeted manner, for example, via FX swap agreements with the commercial banks. A typical policy mistake in a currency/banking crisis is the general and undiscriminating provision of domestic currency liquidity (e.g. through reductions in the minimum required reserve rate) and leaving it to the spot FX market to make conversions for the banks that are in need of FX liquidity. The result often is a general run on the currency financed and aggravated by the central bank’s liquidity provision. Some central banks participating in our CSEs did not seem to be aware of this trap. However, others (typically those with relatively small reserves) were fully aware and had already prepared template FX swap contracts with the commercial banks for such occasions.

**Integrating monetary policy in crisis response.** We observed very different patterns of behavior in a twin (currency/banking) crisis during the CSEs. Some central banks did not hesitate to use (substantial) interest rates hikes, while others tried to separate monetary policy from managing a financial crisis. Not surprisingly, this division was roughly in line with
exchange rate flexibility: central banks operating a de jure or de facto currency peg were ready to raise rates while more flexible regimes were reluctant. In one particular CSE the team playing the Central Bank Board explicitly refused to make any interest rate moves during the simulated crisis, saying that financial stability and monetary policy should pursue separate goals that should not be mixed. However, following an external shock shortly after the CSE, the country found itself in a real-life twin crisis, in which the central bank resorted to substantial interest rate hikes.

**The role of deposit guarantee funds (DGFs) in crisis management.** In ECA, DGFs are typically set up following a simple “pay-box” model. In bank resolution, only a few can go beyond the role of simply paying out depositors (and even then only a little bit). One particular area where some of them were able to move beyond the “pay-box” role was to use their funds to top-up the asset side in a P&A transaction. Usually all the other stakeholders realized that this was a cost-efficient solution and the DGF was best positioned (meaning better than the central bank or the government) to perform it. Another aspect that often came up in our CSEs was the liquidity of DGF funds. Even if some countries have a reasonably “funded” DGF, its funds are invested in (domestic as well as foreign) public debt and there is no clear way to make these funds liquid when they are needed to pay out deposits. A straightforward solution would be that the central bank does a repo with the DGF, taking in its government securities and providing liquidity in exchange. However, a recurring technical problem was that central banks typically had a pre-defined list of clients (mostly commercial banks) with whom they were allowed to do monetary operations (such as repos) and this list typically did not include the DGF. Some countries had more cumbersome arrangements such as a central bank loan to the DGF given a government guarantee. A clear lesson from the CSEs was that a pre-arranged central bank repo line to the DGF is a superior solution. A further finding was that coordination between the DGF and other stakeholders in crisis management, especially joint communication with the public was often problematic, particularly in case the DGF was not a member of the FSC. The DGF was often not informed by the central bank in time about problems emerging in a certain bank and joined the crisis management only belatedly. One possible cause for this may be that DGF governance is often dominated by the central bank, and many central bank staff assume that the DGF will be informed about emerging problems in the banking sector by the central bank representatives sitting on its board. Sometimes we got the impression that they perceived the DGF practically as an extension of the central bank that would somehow be automatically informed. Yet, the public perception of the DGF can be very different, treating it as a separate institution. For example, in crisis situations media attention may focus on the DGF directly, and being under-informed in such a situation may prove to be very detrimental to credibility, not just that of the DGF but of the whole national crisis management framework.

**Home-host (and host-host) supervisory coordination.** Given the high penetration of foreign (mostly Eurozone) banks in our ECA client countries, our CSE scenarios in the region almost always featured elements to test foreign coordination in a stress situation. Some had no Memorandums of Understanding (MoUs) on information sharing with the relevant home supervisors. Even where MoUs were in place, we often came across systematic errors in
contacting potential sources of information, such as demanding information from the parent bank instead of the parent supervisor. The launch of the SSM also seems to have confused host supervisors as to whether they should contact the home supervisor or the ECB in case of an emerging crisis situation. Another lesson of the CSEs in this respect was that opportunities for host-host information sharing (keeping in touch with supervisors of subsidiaries of the same parent group in other countries) are often not utilized effectively by the authorities. For example, some of our CSEs included a regional divestment story, in which the foreign parent group wanted to sell a number of its subsidiaries in different countries together as a package. In such situations we typically did not see the host supervisor actively contacting the other hosts to obtain information, let alone to formulate a common strategy.

Over-confidence in parent banks’ support. We often came across a somewhat complacent attitude from the local authorities stemming from their conviction that Eurozone parent banks would provide full capital and liquidity support for their local subsidiaries (although authorities in countries with exposure to Greek parents were much more cautious). This was mostly based on their post-2008 experience and, as such, may have been exacerbated by the success of the first Vienna Initiative. Nevertheless, parents may not show the same degree of commitment again and this warrants more caution from the authorities’ side. There are plenty of global counter-examples, where subsidiaries were left alone by their parents, especially in the case of a joint sovereign/banking crisis (Philippines, Vietnam, Latin-America, etc.).

Communication. CSEs are essentially communication exercises. They show how participating authorities understand different crisis scenarios and react to them with the available legal instruments and financial resources. They also reveal how participants share information among themselves, how they communicate with key stakeholders like bankers and foreign authorities, and with the general public, either directly via press releases or indirectly through journalists.

Regarding communication among participating teams, CSEs make it possible to detect whether key players such as internal central bank departments like Supervision and Market Operations share their respective pieces of information and their views about them, building a shared understanding of the facts of the scenario before reporting them to the ultimate decision-maker (the Governor or the Board) or if, alternatively, they tend to separately elevate the isolated facts they learn and wait for the ultimate decision-maker to understand and react to them. If there is some horizontal communication, it is also possible to observe whether it is mutual or systematically one-sided (only from Market Operations to Supervision, for example). Interestingly, it is possible to evaluate this fundamental dimension of the crisis management process by simply observing the metadata of the sequence of messages that take place: the “who talks to whom”, conveniently represented by the resulting network graph (see the Annex on our methods of analyzing metadata). Metadata is also frequently sufficient to determine how a particular key fact of the scenario is disseminated among participating teams: not only who learns about it and who is out of the loop, but also at which point during
the decision-making process each participating team learns about it. This is particularly important when the exercise involves interactions among different institutions, such as bank and non-bank supervisors, or between the central bank and the deposit insurance agency. Bank supervisors that learn, for example, about a problem affecting the stability of a bank that provides critically important services to mutual funds or insurance companies may or may not timely communicate it to the relevant non-bank supervisor; and/or they may not (or not timely enough) inform the deposit insurance agency about the upcoming resolution of an impaired bank.

Communications with key stakeholders, particularly home supervisors and parent banks, frequently reveal limited understanding about what to expect from those counterparts in terms of information about, or capital or liquidity support for, a local subsidiary in trouble. This frequently leads to either missed opportunities of learning about key facts of the scenario, or to over-optimistic expectations about external support.

Public communications frequently reveal the absence of well-designed plans, for example about the appropriate nature and timing of the information to be disclosed, and in some cases lack of coordination between different agencies (for example between the Ministry of Finance and the Central Bank, or between bank and non-bank supervisors, or between the Central Bank and the Deposit Insurance Agency), leading to embarrassingly contradictory statements. While interactions with journalists are harder to evaluate objectively, because these are role-played by the control team and may or may not adequately reflect local communication patterns, they can also be revealing of the power of the press to affect key public-policy decisions.

In a fully-fledged twin (banking and currency) crisis the authorities’ (especially the central bank’s) communication on the exchange rate is of crucial importance. An important principle in such situations is that communication and central bank action should be consistent. If the central bank is actively intervening in the FX market but at the same time emphasizes the floating nature of the exchange rate regime in its communication with the public (for example to avoid being held responsible for major depreciations), such communication can easily turn counter-productive as interventions may become increasingly ineffective. The general principle of “do what you say and say what you do” minimizes this risk. Nevertheless, when it comes to communication on the interventions themselves, some constructive ambiguity may be warranted. Some central banks in our simulations started out with daily announcements of intervention amounts, presumably to show the firepower and the determination to the market. However, this practice is a double-edged sword, especially if FX reserves reduce close to or below adequate levels. If in periods of moderate stress the public gets used to an FX intervention communication practice by the central bank that is immediate and explicit (including amounts), then they may demand this information in periods of heightened stress as well. This may eventually put the central bank in an uncomfortable situation. Therefore it is generally advisable to follow a more low-profile communication strategy regarding FX-interventions, for example publishing FX intervention amounts, if any, or FX reserve size with a one-month lag. Occasionally, if it is deemed necessary, the commitment of the central
bank to smooth excessive fluctuations can of course be expressed, but ideally even then without specifying any intervention amounts.

**Lack of “ownership” in cyber security issues.** Our CSEs scenarios recently began including cyber incidents, typically as triggers for a dent in public confidence. Our impression was that cyber issues have been understood by the authorities as strictly technical issues for IT departments, not as a matter of concern for the highest decision-making levels. One resulting consequence was the lack of a predefined public communication strategy regarding cyber incidents. Dealing with cyber-attacks was typically considered the sole responsibility of affected banks, disregarding any systemic implications. There is a very important role for the central bank in dealing with financial sector cyber incidents, as there is a fundamental coordination problem in this set-up. Cyber incidents (such as malware attacks) are very often contagious and thus, by construction, potentially systemic. Sharing information about incidents between banks is of utmost importance so that preventive and mitigation measures can be quickly taken in unaffected institutions. However, a bank under attack is unlikely to voluntarily inform other banks for fear of, for example, being closed out of the interbank market or being publicly stigmatized by competitors. The central bank is probably the only institution that can help to overcome this coordination problem among banks and thus contain the escalation of a cyber-attack on the financial system. Few central banks in our CSEs showed sufficient awareness of this crucial role for them in managing cyber incidents.

### 4.2 Lessons for CSE design

**CSE playing team structure: Central Bank Market Operations is essential.** The core playing teams in a CSE are the central bank’s top management (Board or Governor), Banking Supervision (which in ECA is typically also incorporated in the Central Bank), and the Ministry of Finance. In addition to these three core teams, we sometimes included the Deposit Guarantee Fund as a separate playing team (if it had sufficient autonomy and discretion about certain decisions in the crisis management process) and/or the non-bank regulator if it existed separately and the non-bank segment was particularly relevant for systemic risk. Initially our CSEs did not feature the central banks’ Market Operations departments (the ones dealing on the FX, interbank and government securities markets) as separate players. However, we learned over time that in ECA, where currency substitution and/or widespread FX lending create a tight link between banking sector stability and stability on the FX market (via both credit risk and liquidity risk), these departments play a crucial role both in gathering market information and in the actual implementation of crisis management decisions. Having recognized this, we aimed to provide an independent role for Market Operations in our ECA CSEs as much as possible. Our experience showed that internal communication between Central Bank Banking Supervision and Market Operations departments often proved to be lacking.

**Structure playing teams so that the focus is not on formalities.** On one occasion, where our scenario was especially heavy on licensing/legal issues, we decided to have the Legal department of the central bank as a separate playing team. It did not work out very well,
as the team tended to focus too much on formalities and requested the same from other teams, which slowed down the action substantially. In other cases the legal experts were represented in the playing teams (typically in the Governor/Board team and sometimes also in the Supervision team), which proved to be a much more constructive set-up.

**Composition of participants: continuity (presence of long-time staffs) is just as important as seniority.** When it came to CSE participants, we usually aimed at having as players in the game those persons who would actually be handling a financial crisis in real life. That means we usually had very senior decision-makers (central bank governors, deputy governors, finance ministers and deputy ministers, etc.) playing in our simulation games. While seniority is certainly a key factor, we also found that building the institutional memory and capacity of the relevant authorities is just as important. Therefore we also need as players staff that are expected to spend a relatively long-time in the given institution, such as career central bankers and long-time ministerial staff. This is especially important in the case of the finance ministries, where the senior decision-makers (ministers) are typically politicians that, naturally, come and go and we need more junior career staff as well to participate in the CSEs, so that the experience stays long enough in the institutional memory.
ANNEX: Analyzing the action: statistics, metadata and slicing the scenario

Analyzing the output of a simulation is not easy: the written record amounts to a long series of not necessarily well written emails (numbering anything between 250 and 600) reflecting multiple dialogues (on different matters, among different counterparts). Sequentially reading all these emails is quite difficult, and may easily lead to overlooking important patterns. To detect these patterns we have been increasingly analyzing email metadata (such as the history of senders and addressees in conversations), and slicing the full record according to the three or more stories that we typically include in our scenarios.

The public and private messages that we use to describe the scenario are primarily intended to motivate exchanges among the participants (the “players”), not between them and us (the “role-players” or “Control Team”). Consequently, an interesting measure of the success of a simulation is the evolution over time of the ratio of messages among playing teams to total messages (which also include messages between players and the various fictitious sources of private information that we, as the control team, role-play). Consider, for example, the strikingly different volumes of interaction achieved in two of our recent simulations:

Figure 1: Share of Player-to-Player communication in total communication in two CSEs

Note: Horizontal axis shows message numbers.
Network graphs derived from the volume and direction of the interaction between each pair of teams of decision makers, and between each one of them and us (the “Control Team”), quickly reveal important patterns. The following network graph illustrates, for example, the very limited (relative to the total volume of information received from the Control Team, revealed by the width of the links between pairs of nodes), and highly asymmetric (revealed by the relative size of the arrows pointing in the respective directions) flow of information between Supervision and Operations in a certain country (Country D). These Central Bank departments in Country D obviously don’t talk much to each other, preferring to communicate their views and information directly to the Governor, and the limited communication that takes place between them is more likely to be from (Market) Operations to Supervision than the reverse.

**Figure 2: Network graph of interactions of the CSE in Country D**

As another example, the following network graph illustrates - among several other revealing features - the unusually active roles of the Financial Stability Department and the Deposit Guarantee Fund in yet another of our CSE countries, Country E.
Slicing the full record in the three or more stories comprising the scenario greatly facilitates understanding the action. A recent example: “Beta Bank” reports to Bank Supervision that they have been the target of a cyber-attack posing a clearly systemic risk. Supervision seems to misinterpret the problem, taking it as a Central Bank only issue:

Msg#: 164
From: bank_supervision_dept
To: info_tech_dept, executive board, staff_bank_supervision, licensing_standardization_dept, legal_dept
Subject: Re: MONTH 3: Kaspersky Lab’s preliminary forensic report

The email below contains a virus in the attached file that we deleted. It is our opinion that our Central Bank IT system is also infected. Please be aware that we will not send further e-mails until we have confirmation from our Central Bank IT department that email system is secured.
This interpretation of the problem leads the Board to instruct its in-house IT department to eliminate the malware, ignoring other potentially interested parties:

```
Msg#: 174
From: executive board
To: info_tech_dept
Subject: Re: MONTH 3: Kaspersky Lab's preliminary forensic report

Please inform us if we are under attack and take necessary actions to solve this problem ASAP
```

When the Ministry learns from the “press” the true nature of the problem, it complains to the Board, naturally generating unnecessary tension between the top authorities:

```
Msg#: 178
From: mof
To: executive board
Subject: Beta Bank cyber attacks

Dear Members of the Board, I recently read in the local news that Beta Bank has suffered large losses due to recent cyber-attacks. Apparently, this has been a well-guarded secret within the central bank and Beta Bank. I was surprised for not being informed of this by you in due time instead of reading about it in media. Given Beta Bank’s share in the Government’s T-bill market, I am particularly concerned about our deficit financing and the liquidity position of this bank, as well as the potential need for utilizing the ELA fund. Given our budgetary limitations, we must be informed of the developments regarding this issue. Please inform me about the potential loss and your actions you have taken to tackle this problem as soon as possible. Sincerely, Minister of Finance
```