The process of macroprudential oversight in Europe☆

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Abstract

The 2007–2008 financial crisis has paved the way for the use of macroprudential policies in supervising the financial system as a whole. This paper views macroprudential oversight in Europe as a process, a sequence of activities with the ultimate aim of safeguarding financial stability. To conceptualize a process in this context, we introduce the notion of a public collaborative process (PCP). PCPs involve multiple organizations with a common objective, where a number of dispersed organizations cooperate under various unstructured forms and take a collaborative approach to reaching the final goal. We argue that PCPs can and should essentially be managed using the tools and practices common for business processes. To this end, we conduct an assessment of process readiness for macroprudential oversight in Europe. Based upon interviews with key European policymakers and supervisors, we provide an analysis model to assess the maturity of five process enablers for macroprudential oversight. With the results of our analysis, we give clear recommendations on the areas that need further attention when macroprudential oversight is being developed, in addition to providing a general purpose framework for monitoring the impact of improvement efforts.

Keywords: macroprudential oversight, process readiness, safeguarding financial stability

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“Putting in place this emerging framework for financial stability will be difficult. As we have seen, it requires new consensus and tools, but it also requires additional resources, better data, time, and international cooperation to enable us to take timely action.”
– Jaime Caruana, General Manager of the BIS, Washington DC, 23/04/2010

1. Introduction

The current financial crisis has highlighted the importance of a system-wide, or macroprudential, approach to safeguarding financial stability (e.g., Borio [4]). Rather than being only concerned with the stability of individual financial institutions, it involves the tasks of preventing and mitigating systemic risks to avoid widespread financial distress and at the same time also consider economic growth (e.g., ESRB Regulation, Article 3(1)). Given these aims, macroprudential oversight can be viewed as a process, which exhibits inherent complexity. In the case of macroprudential oversight in Europe, the system of financial supervisors include a large number of actors both at the European and national level, with a common goal of safeguarding financial stability. With the European System of Financial Supervisors currently in the making (e.g., EU Commission [16, 17]), now is the time to understand activities, define responsible entities and discern how the actors interact. Ongoing public and academic discussion has targeted individual aspects, which oftentimes concern roles of individual institutions, such as legal challenges (e.g., UK vs. ESMA and Germany vs. banking union), the mandate within central banks or politicians (Issing [30]), the role of central banks within the ESRB (Goodhart [19]), ECB as a lender of last resort in the government bond market [9], and a role of E(S)CB in euro area vs. ESRB in Europe (Schoenmaker [43]). Despite these important discussions, little consideration has been given to the inner workings and broad underpinnings of macroprudential oversight at large. In this vein, this paper takes a comprehensive approach to assessing macroprudential oversight in Europe through a process perspective.

Process management concerns the analysis and improvement of ways of working through systematic representations of organizations’ processes (e.g., Segatto et al. [45]). This provides means not only for representing current ways of working, but also for reaching consensus on what form the process should take and possible areas of improvement (e.g., Hammer [24] and Eikebrokk et al. [14]). Yet, this describes the functioning and optimization of processes from the viewpoint of a single organization. In the public sector, processes may be of a different nature. They may involve multiple organizations with a common objective, where the actors take a collaborative approach to reaching the final goal. We denote these as public collaborative processes (PCPs). PCPs involve a number of dispersed organizations cooperating under various unstructured forms. For instance, public health may involve activities ranging from nutritional health advice to the services of both private and public health care centers and hospitals. While being of different nature, in this paper we argue that PCPs can and should still be examined through the lens of process management.

Macroprudential oversight has been described as a process comprising the following high-level tasks (e.g., ECB [13]): risk identification, risk assessment and risk communication, as well as the assessment and implementation of policies. While being relatively well-defined at this level, the tasks still involve a number of uncertainties and limitations that challenge the functioning of the process. At a more detailed level, the process is among other things characterized by a large number of involved actors, a national and supranational level, an inherent political dimension, vast amounts of data, and decision-making based upon expert judgment and numerical methods. Further, macroprudential oversight exhibits a high degree of dependence between and within tasks as in any process. Given the aim of process management, in which activities are to be coordinated so that disperse tasks performed by many different partners act as one seamless process, concerns can be raised about the functioning of the European macroprudential oversight process (as noted in the first paragraph). Understanding dependence within the tasks becomes particularly crucial when moving towards a more detailed representation of the process, which is the essence of process management. However, an essential prerequisite for detailing and documenting a process is a common agreement of the activities at the focus of attention and the roles of all involved parties, i.e., who is doing what. As a prerequisite
for process management, this paper examines the maturity of the macroprudential oversight process through various constructs, such as process design, metrics, and ownership. As such, by identifying areas of improvement and directing attention at needs, this work lays the foundation for reaching a more mature process for safeguarding financial stability.

With the aim of assessing the maturity of macroprudential oversight in Europe, this paper conducts an interview study and builds an analysis model. The study includes interviews with 23 key policymakers and supervisors from 12 organizations involved in macroprudential oversight across Europe. The interviewees were asked a series of questions relating to macroprudential oversight in Europe, which were mapped to five so-called process enablers ([23, 24]). The answers were used to assess the maturity of macroprudential oversight in relation to (i) design, (ii) metrics, (iii) performers, (iv) infrastructure, and (v) ownership of the process. We provide an analysis model for assessing the maturity of the five process enablers for macroprudential oversight in Europe, in which we measure both the level and dissensus in process readiness. This provides a basis to give clear recommendations regarding the areas that need further attention when developing macroprudential oversight in Europe. Rather than an ending point, our analysis model also puts forward a structured approach not only to assess the current state but also to monitor the impact of any improvement efforts. As such, a further aim of this study is to inspire other assessments with a similar goal in the future.

The paper is structured as follows: first, we briefly discuss macroprudential oversight in light of currently available material. This is followed by a discussion of business process management, and how this can be applied in the context of PCPs. In this section, we also examine the differences between standard processes and PCPs, and show that despite differences a similar approach to formalizing and improving ways of working is appropriate. In the next section, we discuss our approach to analyzing data and the results of our analysis of process readiness, and present the areas of improvement needed for reaching a mature process for safeguarding financial stability. In the conclusion we put forward an agenda for future research, suggesting how we can move from an analysis of process readiness to full-blown process management.

2. Macroprudential oversight

Paraphrasing Milton Friedman’s statement about Keynesians, Borio ([4] stated “We are all macroprudentialists now.” The 2007–2008 financial crisis has paved the way for the macroprudential approach to safeguarding financial stability, which has now grown consensus among the academic and policymaking communities alike. Yet, it is no new concept. The BIS applied the term to describe a system-wide orientation of regulatory frameworks already in the 1970s (see, e.g., BIS [3]). The series of recently established bodies for macroprudential supervision, as well as their effective or planned mandates, obviously also motivates understanding and disentangling their specific tasks and functions, such as the European Systemic Risk Board in Europe, the Financial Policy Committee in the UK, and the Financial Stability Oversight Council in the US.

2.1. Market imperfections and systemic risk

A comprehensive macroprudential approach to safeguarding financial stability obviously starts from a thorough understanding of the inner functioning, particularly potential dysfunctioning, of the financial system. While definitions related to financial stability remain to be disputed in the literature, one notion that few oppose is that a key aim is to have a resilient and well-functioning financial system. One characterization of such a financial system is through the three pillars proposed by Fell and Schinasi [18]: well-managed financial institutions, efficiently functioning financial markets and a strong and robust financial infrastructure. That said, the frequent incidences of costly financial crises do, however, indicate that the three pillars do have defects. While each recurrence of financial instability may have sources of its own kind, market imperfections like asymmetric and incomplete information, externalities and public-good characteristics and incomplete markets can be a threat to the functioning of the financial system. These imperfections, when being related to a financial sector, may lead to
significant fragility of not only individual institutions, but also the entire system, as noted for instance by Carletti [5]. While not being directly caused by market imperfections, de Bandt and Hartmann [7] relate fragilities in financial systems to three causes: (i) the structure of banks, (ii) the interconnection of financial intermediaries, and (iii) the information intensity of financial contracts. The material risks of these fragilities support the role of governments and other supervisory authorities in addressing and monitoring financial instability, which also points to financial stability being a common good and systemic risk an externality.

Beyond market imperfections, we can concretize the fragility of financial systems through the notion of systemic risk. Herein, we follow the definition of three forms of systemic risk by de Bandt et al. [8]: (i) endogenous build-up and unraveling of widespread imbalances; (ii) exogenous aggregate shocks; and (iii) contagion and spillover. The first form of systemic risk focuses on the unraveling of widespread imbalances and is illustrated by the presence of risks, vulnerabilities and imbalances in banking systems and the overall macro-financial environment prior to financial crises. Early and later literature alike have identified common patterns in underlying vulnerabilities preceding financial crises (e.g., Minsky [33] and Reinhart and Rogoff [38]). The second type of systemic risk, exogenous aggregate shocks, have been shown to co-occur with financial instabilities (e.g., Gorton [21] and Demirgüç-Kunt and Detragiache [12]). One example is the collapse of banks during recessions due to the vulnerability to economic downturns. The contagion literature provides evidence on the final, third form of systemic risk, which involves the cross-sectional transmission of financial instability (e.g., Upper and Worms [51] and van Lelyveld and Liedorp [52]). Here, episodes of financial instabilities have been shown to relate to the failure of one financial intermediary causing the failure of another.

2.2. The macroprudential oversight process

The above described market imperfections, and thereby caused systemic risks, are a premise for macroprudential oversight. Accordingly, an essential task is the aim of signaling these systemic risks at an early stage. This necessitates access to a broad toolbox of approaches to measure and analyze system-wide threats to financial stability. Broadly speaking, tools and models can be divided into those for early identification and assessment of systemic risks. ECB [13] provides a mapping of tools to the above listed three forms of systemic risk: (i) early-warning indicators and models, (ii) macro stress-testing models, and (iii) contagion models. First, by focusing on the presence of vulnerabilities and imbalances in an economy, early-warning models can be used to derive probabilities of being in a vulnerable state, in which a shock descending from any source may trigger a systemic financial crisis (e.g., Alessi and Detken [2] and Lo Duca and Peltonen [32]). Second, macro stress-testing models provide means to assess the resilience of the financial system to a wide variety of aggregate shocks, such as economic downturns (e.g., Castrén et al. [6] and Hirtle et al. [26]). Third, contagion and spillover models can be employed to assess how resilient the financial system is to cross-sectional transmission of financial instability (e.g., IMF [28]). In addition, the literature has also provided a large set of coincident indicators to measure the contemporaneous level of systemic risk (e.g., Holló et al. [27]). While coincident measures may be used to identify, signal and report on heightened stress, they are not designed for early identification and assessment of risk.

Despite the importance of analysis, in which risk identification and assessment is in focus, the most central part of macroprudential oversight relates to policy interventions. In terms of a process, Figure 1 puts forward the steps in the process that a macroprudential supervisory body follows. As described by ECB [13], macroprudential oversight can be related to three steps: (i) risk identification, (ii) risk assessment, and (iii) risk communication, policy assessment, risk warnings and policy recommendations and implementation. The process in Figure 1 deviates from ECB [13] by disentangling the final step into two separate feedback loops, as proposed by Sarlin [39]. In the figure, red components represent risks and vulnerabilities, green components represent the need for risk identification and assessment, gray components represent policy assessment, risk warnings, policy recommendations and policy implementations, and blue components represent risk communication. With no detailed treatment, we present herein the key tasks and tools used in each step.
In the *first* step of the supervisory process, the key focus is on identifying risks to stability and potential sources of vulnerability. The vulnerabilities and risks could exist in any of the three pillars of the financial system: financial intermediaries, financial markets, and financial infrastructure. The necessary analytical tools to identify possible risks, vulnerabilities and triggers come from the set of early-warning models and indicators, combined with the use of market intelligence, and expert judgment and experience. This involves ranking risks and vulnerabilities as per intensity, as well as for assigning probabilities to specific shocks or future systemic events.

In the *second* step of the process, the rankings and probabilities may be used to assess the identified risks. Beyond market intelligence, as well as expert judgment and experience, risk assessment makes use of analytical tools mainly from the set of macro stress-testing models and contagion models. In macro stress-testing, simulations of most plausible risk scenarios show the degree of impact severity on the overall financial system, as well as its components. Contagion models, on the other hand, might be used through counterfactual simulations to assess the impact of specific failures on the entire financial system and individual institutions. The first and the second step of the process should not only provide a list of risks ordered according to possible severity, but also contain their materialization probabilities, losses given their materialization, and real losses in output and welfare, as well as their possible systemic impact. Hence, these two initial steps in the process aim at early risk identification and assessment and steer subsequent actions for safeguarding financial stability.

The *third* step of the process involves the assessment, recommendation, and implementation of policy actions as early preventive measures, as well as the communication of risks and vulnerabilities. Based upon the identified and assessed risks, a macroprudential supervisory body can consider giving a wide variety of risk warnings and recommendations for other parties to use policy instruments, as well as implementations of policies given the instruments at hand. With no detailed discussion of policies, the most prominent tools to steer system-wide risks include countercyclical capital buffers (CCBs), and loan-to-value (LTV) and debt-to-income caps, among many other discussed policy tools. To steer their decisions, the policy assessment step can make use of the same analytical tools used for risk identification and assessment. Likewise, risk warnings and policy recommendations can make use of the analytical tools. While the use of policy tools may be beyond the mandate of some macroprudential supervisory bodies, actions tailored to the needs of a system-wide orientation are obviously a key part...
of macroprudential regulation and supervision. As illustrated in Figure 1, policies and their recommendations have an impact, not only on the assessment of policy and identification and assessment of risks, but obviously also directly on market imperfections and the accumulation of systemic risks. The feedback of risk communication can, likewise, be divided into those that affect the risk identification and assessment and those affecting the financial market at large, where the former can be targeted with internal communication and the latter with external communication. Moreover, the information to be communicated might derive from the risk identification and assessment steps, as well as from the other tasks in step three.

2.3. European System of Financial Supervisors

The European transition towards a common framework for macroprudential oversight can be motivated with goal of reaching financial stability in an environment of cross-border finance. Accordingly, paraphrasing the classic trilemma of monetary policy, the financial trilemma questions the possibility of simultaneous (i) financial stability, (ii) financial integration and (iii) national financial policies. As proposed already by Thygesen [49] and Schoenmaker [41], and formalized in Schoenmaker [41], one of the three objectives has to give. In a world of increasing financial and economic integration, this indicates that the task of producing the public good of financial stability ought to also involve a supranational level, as proposed by De Larosière [10].

To understand the set-up of macroprudential oversight in the European case, we need to focus on the entire system of financial supervisors. In this section, we briefly discuss the actors and their roles in the European System of Financial Supervisors (ESFS). Without including strictly political institutions, the actors involved in safeguarding financial stability are the following: European Central Bank (ECB), European Systemic Risk Board (ESRB), national central banks (NCBs), European Commission (EC), European Banking Authority (EBA), European Insurance & Occupational Pensions Authority (EIOPA), European Securities & Market Authority (ESMA), and national banking, insurance and securities supervisors. While their common aim is safeguarding financial stability at various levels, it is needless to say that disentangling activities and functions, as well as their connectors, at the level of responsible entities substantially increases complexity.

Following the description by the European Commission [16, 17], as well as the illustration by Hartmann [25], we can move towards an understanding of the overall division of aims and focus areas. First, Figure 2 shows that supervision is divided into microprudential and macroprudential supervisory bodies. Second, within each of these two branches, the actors consist of both national and European institutions. Third, there exists a large share of interaction and collaboration both between and within these two groups of supervisors. For instance, while microprudential supervisory bodies do not have macroprudential oversight as their key aim, they are oftentimes the ones implementing policies according to recommendations by macroprudential supervisory bodies. Likewise, microprudential information is an important input to analysis of system-wide risks by macroprudential supervisors. Yet, while we herein illustrate the complexity of macroprudential oversight in Europe, we do not provide a detailed description of tasks, interaction and collaboration.

Moving beyond the stylized representation in Figure 2, we should not forget that institutional models in Europe significantly vary among countries. Following the 2012 ESRB recommendation (ref. ESRB/2011/3) and the EU Capital Requirements Regulation (CRR, Regulation No. 575/2013), European Union member states were required to set up a designated authority for macroprudential supervision. In addition to political and legal heterogeneity across countries, the organizations mandated with macroprudential oversight include Ministries of Finance, central banks, financial supervisory authority (FSA) and joint committees of all above. As is shown in Table 1, which is based upon ESRB IWG WP/2013/011 and Schoenmaker [41], the central bank is mostly tasked with macroprudential oversight, yet not at all always

\[1\] See ESRB [14] for a breakdown at the country level.
separate departments, whereas some FSAs are alone mandated with macroprudential policy. This points also to another dimension of complexity in the ESFS: multiple policy goals.

Figure 2: The European System of Financial Supervisors

Table 1: ESFS’s institutional models for macroprudential oversight

| Model 1 | Model 2 | Model 3 | Model 4 |
|---------|---------|---------|---------|
| Agency  | Ministry of Finance | Central bank | FSA | Committee |
| Euro area | 0 (0%) | 11 (58%) | 4 (21%) | 4 (21%) |
| Non-euro area | 1 (10%) | 6 (60%) | 1 (10%) | 2 (20%) |
| Total | 1 (3%) | 17 (59%) | 5 (17%) | 6 (21%) |

Moving from financial stability to other policy objectives highlights the fact that we should not consider one sole process separately but rather in conjunction with other tasks of the actors in the ESFS. In the vein of Tinbergen’s [50] analysis, each policy objective ought to be mapped to a policy instrument, and ideally each objective has one independent instrument. Following the analysis by Schoenmaker [42], Table 2 shows the potential for synergies and/or conflicts among policy objectives, when considering monetary, macroprudential and microprudential policies, objectives and goals together. While each policy has a direct impact on its own objective, they have a secondary impact on the neighboring objectives, which all might take the form of synergies and conflicts. Even though fulfillment of one policy goal may support the fulfillment of another, the roads to them may involve conflicts. Without weighting synergies vis-à-vis conflicts, this still highlights the fact that no one task can be considered in isolation of others. In fact, this highlights the existence of three separate, yet interacting, processes, which all ought to be managed given their ultimate goals.
### Table 2: Synergies and conflicts between policy objectives

| Policy (typical instruments) | Objective                        | Ultimate goal (impact level)               |
|------------------------------|---------------------------------|-------------------------------------------|
| Monetary policy              | Price stability (short-term interest rate) | Stable and non-inflationary growth (economic system) |
| Macroprudential (LTVs, CCBs) | Financial stability              |                                           |
| Microprudential (LTVs, capital ratios) | Soundness of individual financial institutions | Protection of consumers (individual institutions) |

**Notes:** The figure describes the institutional models in ESFS as reported in ESRB WP/2013/011. A country breakdown can be found in ESRB [15].

3. **Process management**

This section discusses process management as it is applied in our context. With a focus on assessing process readiness, we particularly describe the analysis of public collaborative processes.

3.1. **Business process management**

Broadly speaking, an organizational process can be defined as a chain of activities that make use of an input to produce an output. This implies that any organization, public or private, has processes. The raison d’être for documenting and understanding organizational processes on the other hand goes back to performance. This can imply that there is a desire for improvement, or a desire to overcome shortcomings in performance. Absent any common understanding of a process, it becomes difficult or impossible to meet or exceed any performance targets. While a common understanding of how a process works (and how the activities therein interact) can be implicitly understood by those working on the task at hand, more complex processes that span across organizational entities create a need for more formalized communication.

The roots of quality control and process improvement date back to the seminal book published in 1911 by Taylor [48], which has hitherto influenced many in the process movement. Aiming at process performance improvement, business process management (BPM) descends from two antecedent fields: statistical process control (Deming [11]) and business process reengineering (Hammer [22]). BPM as a field of study takes a holistic approach to managing an organization’s processes. Segatto et al. [45] define BPM as a discipline focusing on gaining a common understanding of processes with the aim of continuously seeking improvement through a feedback cycle, while at the same time also aligning these processes to organizational strategies. They divide BPM to six distinct phases (adapted from ABPMP [1]):

1. **Planning:** In this initial stage, executive sponsors, roles and responsibilities, goals and overall purpose of the BPM exercise are determined.
2. **Analysis:** This involves understanding of the current state of organizational processes.
3. **Design and modeling:** At this stage, a more detailed representation of as-is and/or to-be processes are created. Essentially, this phase focuses on gaining answers to questions such as what is done, by whom, when, how, and in which organizational entity. This is also referred to as process modeling, whereby an external representation of the process is documented as a process model (Eikebrokk et al. [14]).
4. **Implementation:** Here, activities in the organization are, if necessary, adapted to findings from previous stages.
5. **Monitoring and control:** Here, performance metrics are analyzed to see whether these give raise to further changes in the organization.
6. **Refinement**: After an analysis of process performance, further work in the analysis and design phases of the BPM cycle might be necessary.

In the context of these six stages, the assessment of process readiness conducted in this paper falls into the second stage. Despite this, we hope that the ideas and thoughts brought forward in this paper could lead to a more formalized approach to improving macroprudential oversight (stage one: planning). Likewise, we have not made an attempt at improving design and modeling (stage three), as we are not presenting a detailed documentation of the process using a standard annotation for representing all the activities therein. With this study, our focus is thus on establishing whether there is a common understanding of the process, explicit or implicit, among the European System of Financial Supervisors, and on identifying potential bottlenecks in the underlying enablers of a mature process.

### 3.2. Process Readiness

Process analysis, as one of the six distinct phases of BPM, aims at understanding current states of organizational processes. Given the common complexity of today’s processes, analysis invokes structured approaches to gain a better understanding of the inner workings of processes and their associated performance targets. One widely known structured approach to understanding the state of a process is the assessment of process readiness or maturity, as introduced by Hammer [23, 24].

To define a mature, high-performance process, one can assess process-specific characteristics. Hammer [23] defines five critical enablers for well-functioning processes: (i) process design, (ii) process metrics, (iii) process performers, (iv) process infrastructure, and (v) process owners. The design of the process goes back to the specification of what tasks are to be performed, by whom, and what the associated inputs and outputs are. This also involves an understanding of the organization(s) involved and how the activities interact to produce a desired outcome. The metrics of the process detail the desired outcome in more specific terms. Performance needs to be monitored against targets such as speed or quality. With process design and metrics at hand, process performance can be simulated (in relation to, for example, time, cost, and resources needed), allowing for a better understanding of potential improvement areas. This approach has been taken in many different contexts, such as hospitals and banks [29, 46]. The performers of the process are those that perform the process activities. The persons involved should not only be well versed in their particular activity or part of the process, but also be aware of the end-to-end design and metrics of the whole process. A suitable infrastructure also needs to be in place for the process performers to be able to conduct their work. Typically, this involves IT systems with the appropriate access to information they need in order to accomplish their task. For instance, a process improvement effort at a Swiss bank revealed many improvement areas that were specifically related to the IT systems that were used to support the process (Küng and Hagen [31]). Last but not least, a process owner is to be nominated. This is an executive level person or organization that has the authority to oversee the process as a whole. Without a process owner, improvements and changes that span across different involved organizations becomes difficult or impossible.

The primary aim with this study is to conduct an assessment of process readiness according to the enablers outlined above. For this purpose, we rely on a more detailed break-down of the five process enablers, adapted from Hammer [23]. We have designed a set of questions to assess the maturity of each of the five enablers with their sub-categories (all detailed in Section 4.2). Through the assessment of process readiness, we can identify areas of improvement and set the basis for a functioning process, also creating the basis for full-fledged process management, if so desired. Yet, we acknowledge that the nature of processes in macroprudential oversight, as well as some processes in the public sector at large, is somewhat different to a standard business process. Can these be studied with tools from BPM?

### 3.3. Public collaborative processes

Beyond profit-maximizing businesses, societies are organized around public goals regarding the well-being of their citizens. As noted by Olson [34], among many others, the need for public involvement is
mostly related to markets with positive and negative externalities and characteristics of non-excludable and non-rivalrous goods and services, as well as fundamental human rights.\footnote{For a further discussion on theories of economic regulation, readers are directed to the seminal papers by Stigler \cite{stigler1947comparative} and Posner \cite{posner1977law}, as well as a later review by Peltzman \cite{peltzman1976the}.} In addition to involvement only in minor market segments, we define a public goal as a broader ultimate objective provided by the government to the population within its jurisdiction, which might require involvement of a set of public, private and third sector actors.

Comprising of multiple providers acting together for a common purpose, the actors involved in public goals are oftentimes dispersed. Examples of these societal goals include public safety, education and health, as well as a well-functioning financial system. Oftentimes, we also see actors taking on roles that are typically not associated with their primary goal. One such example could be schools educating children in traffic rules and fire hazards, and thus promoting public safety. The police might be offering lectures on drug abuse, and thus promoting public health. Thus, public institutions work together to build a well-functioning society, oftentimes taking on different roles depending on an individual’s particular needs. Sickness, criminal behavior, age, disabilities, and personal interests are all relevant examples of conditions that can trigger a particular response from society. In some instances, the response is highly regulated and clearly defined, such as in the case of criminal misconduct, but oftentimes there is a high degree of informal co-operation and implicit understanding of how to promote a particular goal. The case of public health is such an example. If we disregard the most obvious example of an actor in this field, hospitals, which are usually involved when a de facto health problem already exists, we see a host of actors involved in preventive measures to avoid health issues. This is highly dependent on specific structures in various countries, but it is not uncommon to see a diverse set of actors in fields like education, food safety, and sports promoting health, in addition to the explicit healthcare system. As such, many different actors are then involved in the process of ensuring public health.

We denote the activities performed by various societal actors working together for a common purpose as a public collaborative process (PCP). This is defined as a set of public, private, and third sector actors, working together in a collaborative manner for a societal goal, which is defined and possibly regulated at a governmental level. The complexity of these types of processes becomes apparent when one moves from a high-level description to a lower level, where responsibilities and activities performed by individual organizations are disentangled. The high-level goals for PCPs are typically explicitly documented, and there is often a primary organizational entity that assumes the overall responsibility for the process. However, at a lower level, the activities and cooperation performed by a dispersed set of actors are oftentimes more unstructured in nature, such as following less formal documentation and being more dependent on bilateral agreements. Mostly, these activities are also coordinated at a high level, such as by a responsible ministry, potentially creating a gap between the operative and governing actors.

Macroprudential oversight is clearly a PCP. To begin with, its goal of financial stability can be seen as a public good in that the producer cannot exclude anybody from consuming it (i.e., non-excludable) and consumption by one does not impact that of others (i.e., non-rivalness). Further, it involves collaboration of a large number of dispersed actors to reach the common goal, and their cooperation is fairly unstructured. A crucial question to ask is whether PCPs, including macroprudential oversight, can and should be managed with the same means as business processes. We believe they should, since they contain the same elements. The basic function of any process is to transform inputs to outputs with the ultimate goal of serving customers. This could take on the form of delivering a product or a service, ensuring that a curriculum is taught and understood, ensuring that a particular illness is prevented or treated, or ensuring that financial stability is safeguarded to enable a well-functioning financial system. This basic and fundamental element is common for both business processes and PCPs. The justification of any process, public or private, is that it serves its ultimate customers.

There are, however, differences between business processes and PCPs, specifically in how processes
are adapted to serve customers. Figure 3 illustrates two challenges: indirect and complex feedback loops. A crucial element in firm competitiveness is adaptability to customer needs (e.g., Porter [36]). With the same token, any PCP should ultimately be adapted to serve its customers, the citizens of any given country. However, the feedback loop between the provider and the customer differs substantially when comparing PCPs to business processes. While the firm typically has a rather direct link to their customers, the same cannot be said of PCPs. Instead, any fundamental change to the structure, performers, and function of PCPs is regulated through an oftentimes democratic system, with politicians serving as the representative of the customer, the people. Accordingly, another dimension of complexity derives from the fact that PCPs need not only serve a target group of customers, but rather the population in its entirety.

Despite these challenges may explain the characteristics of PCPs, such as a dispersed set of actors cooperating under unstructured forms, we see no reason why PCPs would not be examined through the means of process management. Accordingly, the lengthy and complex feedback loop in PCPs does not reduce the need to formalize processes. Beyond a more efficient and effective PCP, low process readiness only serves to create confusion, whereas well-documented and understood PCPs serve to direct the attention of both voters and elected officials to matters of importance.

4. Assessing the maturity of macroprudential oversight in Europe

This section presents the overall research design, including approaches for data collection and methodological perspectives, the analysis model used as a basis for drawing conclusions of the data, and discussion and analysis of the collected data with the help of the model.

4.1. Research design

For the purposes of this study, we have conducted a series of interviews involving actors that operate within the European System of Financial Supervisors (ESFS). Initially, we started out by
conducting four semi-structured interviews. The aim with these interviews was to assess a suitable level of analysis, that is, how should we go about looking at macroprudential oversight with the lens of process management. Our interpretation of the semi-structured interviews was that macroprudential oversight is not mature enough for full process management. Although there was an agreement of the aim to effectively and efficiently safeguard financial stability, process design and modeling (with subsequent steps in the six BPM phases) seemed elusive at this stage. Hence, we decided to approach process management from a more elementary perspective by assessing process readiness.

We continued data gathering through interviews. At this stage, we opted for a more structured approach with pre-defined questions that relate directly to the five process enablers. The questions are detailed in Table A.1 in the Appendix. In total, we conducted 23 additional interviews, of which four are written answers from the four interviewees of the semi-structured interviews. This involved a total of 12 organizations within the ESFS. The interviews lasted around 75 minutes each, except for the four written accounts with answers to the same questions. All of the interviews were conducted within May and June, 2014.

Our aim was to have a broad coverage of the organizations depicted in Figure 2. This involves covering both national and European organizations, and policymakers and supervisors, as well as actors within and outside central banks, and with and without a direct macroprudential mandate. In an effort to avoid elite bias (involving only managerial viewpoints), we wanted to ensure not only a broad organizational coverage, but also insights to the opinions of people on all levels within the involved organizations. Generally, we aimed at approaching two experts within each involved organization, out of which one was an operative expert and one a governing expert, both from financial stability functions. Governing experts refer to policymakers and supervisors involved in heading or managing a division or department with financial stability responsibility, whereas operative experts refer to analysts and economists involved in data management and analysis in a similar division.

In Figure 4, we present statistics of the interviewee sample’s characteristics. Out of 23 interviewees, 12 were classified as governing and 13 as operative experts. The sum does not add up as expertise is not mutually exclusive. Due to the small size of their organization, particularly departments focusing on macroprudential tasks, two interviewees were assessed to be in charge of both governing and operative tasks. In a mutually exclusive classification of interviewee’s roles, our sample consists of 14 policymakers and 9 supervisors. The division into policymakers and supervisors follows to a large extent the division between microprudential and macroprudential organizations, with exceptions due to variation in institutional models. For instance, supervisory authorities may be mandated with macroprudential tasks or may be located within the central bank. Hence, we also report that 17 of our interviewees are in an organization with a macroprudential mandate and the same number are located within a central bank. Distinguishing between national and supranational organizations, our sample consists of 10 interviewees at a European level and 13 at a national level.

To promote an open discussion, we give interviewees full anonymity. Furthermore, due to the sensitive nature of the topic, we also made a decision not to record the interviews. With these measures, we feel that there were few inhibitions with regard to our interviewees expressing their true opinion. During the interviews, a brief summary of each answer was written down as the interview progressed. For our data analysis, we relied on this written documentation to obtain an overview of the opinions of our interviewees. Each answer was given a score between 1 and 5, one representing a low readiness with regard to the process enabler being measured, and five representing a high readiness. The scores were given based on a joint discussion between the two authors of this paper. In Table A.2 in the Appendix, we provide guidance on our scaling through examples of given scores. Furthermore, for each measured process enabler and its subdimensions, we also aim at obtaining a measure of consensus between our interviewees through the variation in scores given by us.
Figure 4: Characteristics of the interviewees

4.2. The analysis model

This section presents the analysis model used to assess the macroprudential oversight process. First, we describe how we mapped the interview questions to the process enablers discussed in Section 3.2. Then, we provide a framework for assessing process maturity of macroprudential oversight, in which we measure both the level and dissensus in process readiness. Figure 5 presents the analysis model that we put forward herein.

Following the set-up in Section 3.2, we describe process readiness through the five process enablers: process performers, design, metrics, infrastructure and owner. In order to fit this framework to the process of macroprudential oversight in Europe, we customized our interview questions to the process enablers. The questions aim at capturing the level of readiness for each enabler; compared to Hammer’s [23] original framework we have reformulated the questions to fit the domain in question. At the beginning of each interview, we stressed that we wish to have a European focus throughout the conversation. While the precise formulation of the questions can be found in Table A.1 and the scaling of our scores in A.2, both in the Appendix, the below discussion focuses on the enablers and their subdimensions that we aim at measuring.

- First, we assess process performers through the skillset and mindset of involved actors. Knowledge is assessed through familiarity with macroprudential oversight, including both issues related to policy and decisionmaking, and analysis and assessment of financial stability. Behavior focuses on intrinsic motivation and true interest in improving and developing macroprudential oversight.

- Second, the assessment of process design focuses mainly on a step-by-step specification, or end-to-end design, of macroprudential oversight. This is disentangled into three subdimensions: (i) purpose, a clear end-to-end understanding of macroprudential oversight; (ii) context, an awareness of inputs and outputs among institutions; and (iii) documentation, a clear and accessible specification of tasks to be performed.

- Third, we assess process metrics through the overall use of measurement in steering macroprudential oversight as a process. This mainly concerns the definitions and uses of metrics to ensure efficiency and effectiveness and a balance between costs and benefits in macroprudential oversight, but also involves the use of analytics in measuring systemic risk.

- Fourth, we assess the extent to which tools and human resources provide a sufficient infrastructure for supporting tasks in macroprudential oversight. Tools refers broadly to infrastructure provided by available policy interventions and IT and data-related support functions. Human resources...
as an infrastructure focuses on the sufficiency of hiring, training and development as a support for macroprudential functions.

- Fifth, the assessment of process owners focuses on responsibilities and mandates to oversee macroprudential oversight. More specifically, we are concerned with the responsible entity for well-functioning macroprudential oversight, for guiding development activities and with ultimate mandate to implement changes.

![Diagram](image)

**Notes:** The figure presents the analysis model that is put forward in this paper. For each measured process enabler (and its subdimensions), we represent two measures: level and dissensus of readiness. Level of readiness is represented through positions of a marker along the horizontal dimension, whereas dissensus is shown through the size of the rectangular marker.

**Figure 5:** The analysis model

We view these five process enablers through an analysis model that measures the level of readiness and lack of consensus (or dissensus) for each enabler. Beyond quantifying individual interviewees’ responses into a scale between 1 and 5 for each process enabler, as well as their subdimensions, we also measure the level of readiness and dissensus through quantitative means. The level of readiness \( L \) is computed through a simple arithmetic mean of the observed values \( a_1, a_2, ..., a_n \):

\[
L = \frac{1}{N} \sum_{i=1}^{N} a_i
\]

where \( N \) stands for the size of the sample. The dissensus in readiness \( D \) of an enabler is measured through the standard uncorrected sample standard deviation:

\[
D = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (a_i - L)^2}
\]
where $a_1, a_2, ..., a_n$ are again the observed values and $L$ is the mean value of the observations. We maintain that a low consensus, representing inconsistency in the scoring of a given process enabler, is indicative of an unclear overall status, thus lowering the readiness for that enable. In Figure 5 each process enabler is broken down into a number of subdimensions, for which the level of readiness is represented with the position of a rectangular marker on the horizontal axis (higher readiness to the right) and dissensus as the size of the rectangle.

When mapping the questions to the level of readiness, it should be noted that for some questions the explicit answer is less interesting than the ability to provide an answer in the first place. Such is the case, for example, when we inquire about improvement possibilities to macroprudential oversight. We view clear improvement suggestions as a strong willingness to improve the process, and are less interested in the actual improvement proposal, albeit also important in itself. Moreover, when capturing lack of consensus (or dissensus) in terms of variation in the assessed readiness levels, it is also worth noting that the measure as such is not always reflecting actual dissensus. For instance, despite the interviewees agree upon the existence of process owners, and can name them, it does not reflect the fact that they disagree on the identity of the actual owner.

4.3. Discussion

With the above presented research and analysis model as a basis, this section discusses the results of our empirical analysis. Measuring the level of and dissensus in process readiness in our sample allows us to assess the maturity of macroprudential oversight in Europe. We present the results in Figure 6. Broadly, our analysis shows the following observations. To start with, we observe that ‘process design’ (including purpose, context, and documentation) and ‘process metrics’ (particularly definitions and use of metrics) exhibit the lowest levels of readiness. The level of consensus is high, or in other words, there seems to be an agreement with regard to the challenges in this area. The ‘process performers’ enabler exhibits a relatively high level of readiness but with some disagreement in comparison to design. Analytics to steer process metrics, as well as the ‘process infrastructure’ and ‘process ownership’ enablers, exhibit an average level of readiness, but with larger dissensus. In particular, despite agreement on the existence of a process owner, the lack of consensus on the ownership is especially alarming due to the range of suggestions. Beyond these numerical aggregates, but with them as a starting point, we also tap into the richness of the underlying interview data in the following.

The performers as a process enabler is generally seen as sufficient. Overall, our respondents are familiar with the current setting in macroprudential oversight, in particular from the perspective of their own task, but also from an end-to-end perspective. Most interviewees can name the involved actors. Yet, it is clear, and also obvious, that the ongoing development of macroprudential oversight causes uncertainty due to the lack of visibility to the future. It is also worth noting that our interpretation of questions related to this enabler is indirect in nature, as to minimize a potential sampling bias due to all interviewees’ having a financial stability responsibility. There are certain discrepancies in the answers to the questions related to the behavior of performers. While this can partly be explained by different roles and responsibilities (national vs. European level and hierarchical position), there are some who show a degree of cynicism as to their opportunities to influence and the overall chance of reaching well-functioning macroprudential oversight. As above, the lack of clear insight to the future might have introduced a bias, lowering the perception of the overall willingness to improve the process at a European level.

At a general level, we can clearly observe a lack of readiness in process design. Given the risk of over-emphasizing the political and legislative context in which macroprudential oversight operates, we designed the questions to have a focus on the internal process (i.e., the tasks as described in Figure 1). Despite this, the discussion often revolved around legal and political challenges. These aspects include challenges when moving between the national and European level, challenges that are further accentuated when moving outside states in the euro area. Overall, a great deal of confusion exists regarding who is responsible for different parts of macroprudential oversight. From a context perspective, discussions have highlighted more conflicts between various processes (i.e., policy objectives) than synergies.
Further, no documented end-to-end process exists. Many interviewees referred to legislation, although these are not directly comparable to work descriptions. National level seems to be better documented and more easily accessible than European level.

Notes: The figure presents an assessment of the process of macroprudential oversight in Europe. Level of readiness is represented through positions of a marker along the horizontal dimension, whereas dissensus is shown through the size of the rectangular marker. The figure represents on the left an aggregate result and on the right a result disaggregated for respondents in national and European institutions, respectively.

Figure 6: Assessing the process of macroprudential oversight in Europe

In terms of process metrics, despite wide agreement on the need for them, there are currently no measures of well-functioning macroprudential oversight. In certain cases, references were made to measures of systemic risk, even though there is agreement that they are not the same as well-functioning macroprudential oversight. As a consequence, it is impossible to say whether costs and benefits of macroprudential oversight is aligned, something that some interviewees pointed out would be crucial in gaining customer justification (i.e., acceptance from the public). Analytical models do play a key role in macroprudential oversight, which is agreed upon by almost all interviewees. Despite wide agreement on the use of analytics, the interviewees agree equally much upon the fact that systemic risk is challenging to quantitatively measure. Even with the right metrics in place, measurability and the changing nature of risk have been highlighted as issues, such as concerns with shadow banking.

Infrastructure for macroprudential oversight is generally seen as work in progress; there seems to be agreement on differences in readiness. Policy instruments and tools are available, although possibly still requiring development and amendments in legislation to allow for implementation of suitable measures. IT infrastructure seems to be sufficient but to the contrary, there seems to be wide agreement on needed improvements to the overall data infrastructure, particularly dealing with big data, European-level databases, data quality checks, cross-sectional comparability and linking various sources. One general challenge seems to be related to data sharing, ranging from turf issues to legal issues and lags in making it available. There is consensus on a sufficient overall human resources infrastructure, which supports in hiring of employees. However, interviewees voiced concerns related to the availability of people who have knowledge and know-how of macroprudential oversight. As
the field is new, there is a lack of people with the necessary skills that would directly support the
tasks at hand. This also created a large discrepancy in the answers, and an increase in dissensus,
depending on the focus of the respondent. According to some, but not all, training and development of
existing resources is available, to the extent that time permits. In our view, the level of existing
training depends also on the maturity of other process enablers, such as end-to-end design, measures
of financial stability and analytics.

Regarding ownership, many respondents mentioned one or more responsible entities as being in
charge of well-functioning macroprudential oversight (including the development of the process, and
overseeing tasks and performers). At the same time, many interviewees acknowledged challenges in
this area, clearly indicating that they do not know who is in charge. Furthermore, the range of actors
mentioned by those that were willing to point at the entity or entities in charge was very broad. It
would seem many organizations are involved but no one is having the overall responsibility for
the process. Our approach to scoring indicated fairly low dissensus, but this does not capture the
differences in the named responsible actors. As such, there is little consensus on individual process
owners.

Beyond the level of and dissensus in readiness for individual process enablers, one should not forget
that the enablers are mutually interdependent. In case any one enabler is missing or insufficient, the
rest of the enablers are prone to be ineffective. Hammer exemplifies interdependence as follows:
“A weak owner can’t implement a strong process design, poorly trained performers can’t carry out the
design, a bad design can’t optimize the process metrics […]” In the context under analysis, we can
observe a number of interdependency-linked challenges related to the enablers with lowest readiness:
process design, metrics and ownership. Starting out from improvements to the process design, one
would need other process enablers to guide and implement changes. While process metrics ought to
provide guidance on bottlenecks in the process design, the ultimate implementation of changes is to be
carried through by the process owner. These can be seen as clear hinders to process design improve-
ments. Likewise, as the definitions and uses of metrics show the lowest readiness, and respondents
struggle in defining systemic risk, it is neither clear nor convincing that systemic risk analytics can be
carried out effectively, despite its average readiness. In addition, we have observed that weaknesses
in process enablers may also derive from others enablers, such as challenges in data infrastructure
(process metrics) being a process design problem related to data sharing.

In addition to the five process enablers, the interviewees were asked a final question on the key
challenge and how they would improve macroprudential oversight in Europe. The aim of the question
was to highlight the most significant challenges and to enable a discussion of issues outside the scope
of previous questions. In the following, we will describe a summary of the discussed issues. The most
prominent challenge related to the lack of clear mandates and responsibilities, and the complexity of
the system of involved actors. A number of respondents highlighted many overlapping layers in actors’
tasks and the need to streamline procedures, structures and the overall design of the process. In this
context, many also highlighted problems with data availability and sharing, again pointing to these
issues being a design problem. Relating to metrics, respondents also requested further research and
guidance on the following issues: definitions of systemic risk, how financial instability happens and
the link between policy objectives and tools. Moreover, interviewees also pointed out that we are in
the beginning of macroprudential oversight in Europe, and that time will show and guide us in how
things ought to develop. In fact, interviewees even hinted value in the type of assessment proposed

3To exemplify the wide range of the mentioned involved actors, the interviewees named the following bodies or persons:
ESRB, FSC, FSB, European Council, Heads of State, ECB, ECB’s Governing Council, Mario Draghi, ESFS, European
Commission, Voting citizens, European Parliament, SSM (as of Nov 2014), ESRB’s General Board, national authorities
including central banks (jointly and individually mentioned by respondents), Ministries of Finance, Eurogroup Working
Group, ECOFIN, “those responsible for policy implementation” and “ECB for euro area and ESRB for Europe”, as well
as “no one and all”.

4The wording of the question was as follows: “Forget all restrictions: How should macroprudential oversight in Europe
be improved? What would it take for this to happen?”
and conducted in this paper.

A final view to the analysis model descends from various aggregations. Instead of considering all respondents, we can choose to focus on subsets based upon their roles (see Figure 4). The respondents may be categorized based upon institutional models (see Figure 2) and policy mandates (see Figure 3), as well as differences in the profiles of actors (see Goodhart et al. [20] for a comparison of policymakers and supervisors). This not only provides insights into process readiness, but can also be seen as a type of robustness check with respect to the sampling of respondents. The left column in Figure 4 provides results disaggregated with respect to respondents from national and European institutions. Generally, we can observe that the results are similar in nature. When assessing the largest differences, we can observe that European actors perceive themselves to be more knowledgeable about macroprudential oversight and assess the documentation to be of better quality. This is most likely in line with the fact that actors at the European level are in a position to have better (and potentially earlier) insights into European macroprudential oversight, and might thus also be better aware of the prevailing documentation. The lower level of readiness in IT infrastructure might not only point to challenges in these issues in European organizations, but might potentially also highlight that information systems and data warehouses are more complex when dealing with pan-European infrastructure. The dissensus is higher for all measures, except process performers, which highlights the heterogeneity among European actors. Following all the rest of the characteristics of the respondents presented in Figure 4, we report disaggregated measures in Table A.3 in the Appendix. Despite slight variation depending on the assessed aggregation, the table confirms robustness of the above discussed results in that the same conclusions hold.

5. Conclusion

This paper has illustrated a process perspective to assessing macroprudential oversight in Europe. As a sequence of activities with the ultimate aim of preventing and mitigating systemic risk, macroprudential oversight can be viewed as an inherently complex process, not the least the European System of Financial Supervisors with its large number of actors at national and supranational level. To conceptualize a process in this context, we introduced the notion of a public collaborative process (PCP). PCPs involve multiple organizations with a common objective, where the dispersed organizations cooperate under various unstructured forms and take a collaborative approach to reaching the final goal. In this paper, we have argued that PCPs can and should be managed using the tools and practices common for business processes.

At a more general level, the absence of well-functioning, transparent, and documented PCPs only act to support populism and simplified solutions. If the problem is not known, solutions are hard to find. As such, process readiness in the context of PCPs serves to enhance the political system, a well-functioning democracy. The globally upcoming objective(s) of macroprudential oversight is neither a simple task to tackle nor a dimension free of politics. As the European set-up is in the making, now is the time to understand activities, define responsible entities and discern how the actors interact, which we propose to be done through the lens of process management.

To analyze the macroprudential oversight process, we have conducted an assessment of process readiness through interviews with actors in European macroprudential oversight. Based upon the interviews, we provided an analysis model to assess the maturity of five process enablers for macroprudential oversight. Broadly, when measuring the level of and dissensus in process readiness of macroprudential oversight in Europe, our analysis shows the following observations. To start with, we observe that process design and metrics exhibit the lowest levels of readiness. For both, the level of consensus is high. The enabler of process performers exhibits a relatively high level of readiness but with some disagreement in comparison to design. Analytics to steer process metrics, as well as the process infrastructure and the enabler of process ownership exhibits an average level of readiness, but with larger dissensus. Beyond these numerical aggregates, we have also tapped into the richness of the underlying interview data.
Whereas the results of our analysis point to clear recommendations on the areas that need further attention when macroprudential oversight is being developed, the above concluding summary provides only a snapshot of the maturity of the process, which is likely to be somewhat outdated when this paper goes to press. Hence, we would like to see that we have provided a general purpose framework for assessing process readiness, rather than an ending point. The framework lends itself to regular updates of the assessment of process readiness, enabling monitoring the impact of improvement efforts over time. Likewise, this framework is far from bound to the region under analysis in this paper, not the least to assessments of the state of macroprudential oversight in the US and UK.
References

[1] ABPMP. Business process management bpm common body of knowledge (bpm cbok). Version 2.0., 2nd release, Association of Business Process Management Professionals, Chicago, IL, 2009.

[2] Lucia Alessi and Carsten Detken. Quasi real time early warning indicators for costly asset price boom/bust cycles: A role for global liquidity. *European Journal of Political Economy*, 27(3):520–533, 2011. ISSN 0176-2680.

[3] BIS. Recent innovations in international banking. Report prepared by a Study Group established by the central banks of the Group of Ten countries, Basel, April, 1986.

[4] C. Borio. Implementing a macroprudential framework: Blending boldness and realism. *Capitalism and Society*, 6(1), 2011.

[5] E. Carletti. Competition and regulation in banking. In A. Boot and A. Thakor, editors, *Handbook in Financial Intermediation*, pages 449–482. Elsevier, North Holland, 2008.

[6] O. Castrén, T. Fitzpatrick, and M. Sydow. Assessing portfolio credit risk changes in a sample of EU large and complex banking groups in reaction to macroeconomic shocks. ECB Working Paper No. 1002, 2009.

[7] O. de Bandt and P. Hartmann. Systemic risk in banking: A survey. In C. Goodhart and G. Illing, editors, *Financial crisis, contagion and the lender of last resort: A book of readings*. Oxford University Press, Oxford, 2002.

[8] O. de Bandt, P. Hartmann, and J. Peydro. Systemic risk in banking: An update. In A. Berger, P. Molyneux, and J. Wilson, editors, *Oxford Handbook of Banking*. Oxford University Press, Oxford, 2009.

[9] P. De Grauwe. Design failures in the eurozone: Can they be fixed? LEQS Paper No. 57/2013, 2013.

[10] J. De Larosi`ere. Report of the high-level group on financial supervision in the eu. Brussels, 25 February 2009, 2009.

[11] W.E. Deming. Statistical techniques in industry. *Advanced Management*, 18(11):8–12, 1953.

[12] A. Demirgüç-Kunt and E. Detragiache. The determinants of banking crises in developing and developed countries. *IMF Staff Papers*, 45(1):81–109, 1998.

[13] ECB. Analytical models and tools for the identification and assessment of systemic risks. In *Financial Stability Review (June 2010)*, Frankfurt, Germany, 2010. European Central Bank.

[14] T.R. Eikebrokk, J. Iden, D.H. Olsen, and A.L. Opdahl. Understanding the determinants of business process modelling in organisations. *Business Process Management Journal*, 17(4):639–662, 2011.

[15] ESRB. Allocating macro-prudential powers. Reports of the Advisory Scientific Committee, No 4/May 2014, 2014.

[16] EU Commission. Proposal for a regulation of the European Parliament and the Council on Community macro-prudential oversight of the financial system and establishing a European Systemic Risk Board. European Commission, September 23, 2009, 2009.

[17] EU Commission. Proposal for a Council Decision entrusting the European Central Bank with specific tasks concerning the functioning of the European Systemic Risk Board. European Commission, September 23, 2009, 2009.

[18] J. Fell and G. Schinasi. Assessing financial stability: Exploring the boundaries of analysis. *National Institute Economic Review*, 192:102–117, 2005.
[19] C. Goodhart. The macro-prudential authority: Powers, scope and accountability. *OECD Journal: Financial Market Trends*, 2011(2):1–26, 2011.

[20] C. Goodhart, D. Schoenmaker, and P. Dasgupta. The skill profile of central bankers and supervisors. *European Finance Review*, 6:397–427, 2002.

[21] G. Gorton. Banking panics and business cycles. *Oxford Economic Papers*, 40(4):751–781, 1988.

[22] M. Hammer. Reengineering work: Don't automate, obliterate. *Harvard Business Review*, 68:104–112, 1990.

[23] M. Hammer. The process audit. *Harvard Business Review*, April:1–14, 2007.

[24] M. Hammer. What is business process management? In J. vom Brocke and M. Rosemann, editors, *Handbook on business process management I*. Springer, 2010.

[25] P. Hartmann. Fitting macroprudential into the picture: Models, institutions and instruments. Presentation at the Banco de Espana/World Bank policy conference on Central Bank (R)evolutions, Madrid, Spain on June 17th, 2013, 2013.

[26] B. Hirtle, T. Schuemann, and K. Stiroh. Macroprudential supervision of financial institutions: Lessons from the scap. Staff Report No. 409, Federal Reserve Bank of New York, 2009.

[27] D. Holló, M. Kremer, and M. Lo Duca. CISS – a composite indicator of systemic stress in the financial system. ECB Working Paper No. 1426, 2012.

[28] IMF. Assessing the systemic implications of financial linkages. *Global Financial Stability Report*, April, International Monetary Fund, Washington:73–110, 2009.

[29] S. Islam and M.D. Ahmed. Business process improvement of credit card department: case study of a multinational bank. *Business Process Management Journal*, 18(2):284–303, 2012.

[30] O. Issing. Some lessons from the financial market crisis. *International Finance*, 12(3):431–444, 2009.

[31] P. KÜng and C. Hagen. The fruits of business process management: an experience report from a swiss bank. *Business Process Management Journal*, 13(4):477–487, 2007.

[32] M. Lo Duca and T.A. Peltonen. Assessing systemic risks and predicting systemic events. *Journal of Banking & Finance*, 37(7):2183–2195, 2013. ISSN 0378-4266.

[33] H. Minsky. *Can "it" Happen Again?: Essays on Instability and Finance*. M.E. Sharpe, Armonk, N.Y., 1982.

[34] M. Olson. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Harvard University Press, 1965.

[35] S. Peltzman. The economic theory of regulation after a decade of deregulation. *Brookings Papers on Economic Activity: Microeconomics*, pages 1–59, 1989.

[36] M.E. Porter. *Competitive Advantage*. Free Press, New York, 1985.

[37] R.A. Posner. Theories of economic regulation. *Bell Journal of Economics*, 5(2):335–358, 1974.

[38] C.M. Reinhart and K.S. Rogoff. Is the 2007 us sub-prime financial crisis so different? An international historical comparison. *American Economic Review*, 98(2):339–344, 2008.

[39] P Sarlin. Macroprudential oversight, risk communication and visualization. mimeo, Goethe University Frankfurt, 2013.

[40] D. Schoenmaker. Central banks and financial authorities in europe: what prospects? In D. Mascian-daro, editor, *The Handbook of Central Banking and Financial Authorities in Europe*, pages 398–456, Cheltenham, 2005. Edward Elgar.
[41] D. Schoenmaker. The financial trilemma. *Economics Letters*, 111:57–59, 2011.

[42] D. Schoenmaker. An integrated financial framework for the banking union: Don’t forget macro-prudential supervision. European Economy Economic Papers No. 495, April 2013, 2013.

[43] D. Schoenmaker. Macro-prudential supervision in europe’s banking union. *The World Financial Review*, 2013.

[44] D. Schoenmaker. The land in between. "The ECB and its Watchers seminar on March 12, 2014 in Frankfurt", 2014.

[45] M. Segatto, S.D. de Pádua, and D.P. Martinelli. Business process management: a systemic approach? *Business Process Management Journal*, 19(4):698–714, 2013.

[46] S.J. Shim and A. Kumar. Simulation for emergency care process reengineering in hospitals. *Business Process Management Journal*, 16(5):795–805, 2010.

[47] G.J. Stigler. The theory of economic regulation. *Bell Journal of Economics and Management Science*, 2: 3–21, 1971.

[48] F.W. Taylor. *Principles of Scientific Management*. Harper & Brothers, New York, 1911.

[49] N. Thygesen. Comments on the political economy of financial harmonisation in europe. In J. Kremers, D. Schoenmaker, and P. Wierts, editors, *Financial Supervision in Europe*, pages 142–150, Cheltenham, 2003. Edward Elgar.

[50] J. Tinbergen. *On the Theory of Economic Policy*. North-Holland Publishing Co, 1952.

[51] C. Upper and A. Worms. Estimating bilateral exposures in the German interbank market: Is there a danger of contagion? *European Economic Review*, 48(4):827–849, 2004.

[52] I. van Lelyveld and F. Liedorp. Interbank contagion in the Dutch banking sector: A sensitivity analysis. *International Journal of Central Banking*, 2(2), 2006.
### Appendix A. Questionnaire, scale and aggregations

**Table A.1: The questionnaire and a mapping to process enablers.**

| Process enablers      | Subdimension      | Question                                                                                                                                                                                                 |
|-----------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| **1. Process performers** | Knowledge & Skills | How familiar are you with macroprudential oversight as a whole in Europe? Do you have contact points in all involved actors in macroprudential oversight?                                                   |
|                       | Behavior          | Do you have a clear idea of how macroprudential oversight should be improved? How much influence do you have on macroprudential oversight?                                                                   |
| **2. Process design**  | Purpose & Context  | Is macroprudential oversight well-defined from start to end in terms of who is doing what? How do you see your role in macroprudential oversight versus all other actors? Are the correct actors involved and are roles divided correctly? With whom do you exchange information and what kind of information? Are there overall or particular problems with information flows? |
|                       | Documentation      | Is your role in macroprudential oversight formally defined? Is there a clear and accessible formal documentation of tasks? How would you improve the documentation?                                               |
| **3. Process metrics** | Definition & Uses  | Is there a way to measure well-functioning macroprudential oversight (other than lack of crisis)? How do we know that cost and benefit of macroprudential oversight is aligned (or optimal)? If not, what should measures look like? |
|                       | Analytics          | What is the role of analytical models and tools in macroprudential oversight? Can systemic risk be measured? How do we know that risk is where we are measuring?                                                |
| **4. Process infrastructure** | Information Technology | Do you have the tools and infrastructure needed to perform your duties in macroprudential oversight? Do you have sufficient IT infrastructure for your work? Do you have sufficient data infrastructure (data warehousing/sharing/quality)? What improvements would be needed to support your tasks? |
|                       | Human resources    | How flexible is your human resources infrastructure for supporting macroprudential oversight? How would you improve training, development and hiring to support macroprudential oversight? |
| **5. Process owners**  | Identity, Activities & Authority | Who is responsible for well-functioning macroprudential oversight? Who is responsible for developing macroprudential oversight? Who has the ultimate authority to oversee all tasks and performers involved in macroprudential oversight? Should anyone else be involved in developing and overseeing macroprudential oversight? |
| Process enablers | Subdimension | Question | Example answer | Score | Our comment |
|-----------------|--------------|----------|----------------|-------|-------------|
| Knowledge & Skills | How familiar are you with macroprudential oversight as a whole in Europe? | Providing advice in the policy area, preparing recommendations, preparing guidance material. Broad involvement (within my organization) - broad network, I can check who to contact, we have contact details. | 5 | The wording used, “pretty familiar” could indicate a lower score than 5 (the maximum), but given the fact that this person is involved in building guidelines for macroprudential oversight, and also indicating that he/she has contact details for “a broad network”, we opted for a scoring of 5. This scoring would indicate that the person is very well versed in macroprudential oversight. |
| Behavior | Do you have a clear idea of how macroprudential oversight should be improved? | Problems related to lack of top-down communication. “Don’t they know what the want or don’t they want us to know…? “I” support from [management] missing?” | 3 | For these questions, we are specifically interested in whether the person has an interest in improving the process. In this case, there was a desire for improvement, but the interview also reflected a sense of cynicism - “but nothing has happened”. The interviewees also pointed out that there are communication problems. All in all, we see that the respondent felt somewhat disempowered, despite a desire to improve things. As such, we gave the answer a neutral scoring of 3. |
| Process design | Purpose & Context | Is macroprudential oversight well-defined from start to end in terms of who is doing what? | “No, not yet.” Tools are only being developed. Very few warnings issued, some recommendations. Little policy intervention so far. | 1 | The answers given portray a rather bleak picture with regard to this person’s opinion of the overall awareness of who is doing what in macroprudential oversight. Also indications of turf issues and political challenges. As a consequence, we scored the answer with a 1, indicating very poor readiness. |
| Documentation | Is your role in macroprudential oversight formally defined? | The legislation [of the organization the person works in] clearly dictates this. Through discussions, there is potential to avoid overlaps. People protecting their data, information is power! | 3 | This was one of the more positive answers with regard to available documentation. However, we do not see “regulations” as clear work descriptions, nor do we see that discussions should be needed (in case of clear documentation existing). Due to this, we gave this a neutral scoring of 3. |
| Process metrics | Definition & Uses | Is there a way to measure well-functioning macroprudential oversight (other than lack of crises)? How do you know that cost and benefit of macroprudential oversight is aligned (or optimal)? | “It’s hard to do. I don’t see enough agreement on objectives and measures.” | 1 | These responses indicated clear challenges with regard to process metrics. The beauty of these responses also signals potential opportunities. Accordingly, we gave this answer a score of 1. |
| Information Technology | Human resources | Can systemic risk be measured? How do we know that risk is where we are measuring? | Yes, not quantitatively as a single metric. Utilize a range of metrics, but have to be interpreted by humans (expert judgment). But, “where is the accountability if it is qualitative??” | 3 | These responses indicated clear opportunities for the use of analytical models. At the same time, the respondent was clearly worried (whether justified or not) with qualitative measures needed in conjunction with quantitative models. As such, we gave this answer a neutral scoring of 3. |
| Process ownership | Identity, Activities & Authority | Who is responsible for well-functioning macroprudential oversight? | ESRS, the general board, also with the changes happening in November. | 4 | Overall, these responses indicated no major problems, particularly with respect to IT infrastructure. Yet, the interviewee highlighted needed improvements related to data infrastructure, but indicated also planned future improvements in this direction. Hence, we gave the answer a score of 4. |

**Notes:** The table shows for each process enabler and its subdimensions an example answer, scoring and a comment describing the reasoning behind the score.
Table A.3: Aggregated and disaggregated results with the analysis model.

| Aggregations | 1. Process performers | 2. Process design | 3. Process metrics | 4. Process infrastructure | 5. Process owners | 6. Process owners |
|--------------|-----------------------|------------------|-------------------|--------------------------|------------------|----------------
|              | Knowledge Skills | Behavior | Purpose/context | Documentation | Analytics | IT | HR | A | A | A | D |
| Total        | 4.04 0.93 3.57 0.99 1.74 0.62 2.05 0.79 1.48 0.67 3.05 0.79 3.09 0.85 3.14 1.08 3.22 0.95 2.05 0.87 1.48 0.67 3.05 0.79 3.09 0.85 3.14 1.08 3.22 0.95 |
| National     | 3.69 1.03 3.54 0.88 1.77 0.60 1.77 0.60 1.46 0.66 3.08 0.79 3.31 0.75 3.08 0.95 3.31 1.03 |
| European     | 4.50 0.53 3.60 1.17 1.70 0.67 2.44 0.88 1.50 0.71 3.00 0.82 2.80 0.92 3.22 1.30 3.10 0.88 |
| Governing    | 4.42 0.79 3.92 0.67 1.83 0.72 2.08 0.67 1.50 0.67 3.09 0.83 3.33 0.65 3.33 0.89 3.42 1.00 |
| Operative    | 3.69 0.85 3.23 1.09 1.62 0.51 2.08 0.90 1.38 0.65 2.52 0.76 2.52 0.95 2.52 1.24 3.00 0.91 |
| Policymaker  | 4.29 0.73 3.57 1.22 1.86 0.53 2.00 0.91 1.71 0.73 3.15 0.90 3.07 0.73 3.15 1.14 3.50 0.76 |
| Supervisor   | 3.67 1.12 3.56 0.53 1.56 0.73 2.11 0.60 1.11 0.33 2.89 0.60 3.11 1.05 3.11 1.05 2.78 1.09 |
| Within central bank | 4.18 0.88 3.59 1.12 1.88 0.60 2.00 0.89 1.59 0.71 3.13 0.81 3.12 0.70 3.19 1.05 3.41 0.94 |
| Not within CB | 3.67 1.03 3.50 0.55 1.33 0.52 2.17 0.41 1.17 0.41 2.83 0.75 3.00 1.26 3.00 1.26 2.67 0.82 |
| Macropru mandate | 4.06 0.90 3.53 1.01 1.62 0.64 2.13 0.81 1.53 0.62 3.12 0.78 3.12 0.70 3.19 1.17 3.41 0.87 |
| Not macropru | 4.00 1.10 3.67 1.03 1.50 0.55 1.83 0.75 1.33 0.62 2.80 0.84 3.00 1.26 3.00 0.89 2.67 1.03 |

Notes: The table reports the level of readiness (L) and dissensus (D) for each process enabler and its subdimensions for a number of different aggregations. The aggregations follow the characteristics presented in Figure 4.