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Anne Liis Kasterpalu

Restoring the Integrity of Interest Rate Benchmarks

A Network Governance Approach

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<p>Reforming the systemically important interest rate benchmarks has proven to be a highly complex and uncertain undertaking, requiring strong collaboration between market participants and the official sector. Introducing public-private collaboration to tackle complex policy issues has become a common phenomenon in modern society, indicating the transition towards more collaborative and integrative approaches to governance. This has led to a strong focus on the role of networks in social coordination, given their potential for facilitating interaction, cooperation and learning between different parties.</p> <p>Designed as an explanatory case study, the objective of this research paper was to explore the performance of governance networks. Drawing on the literature of wicked problems and meta-governance, the study aimed to answer the following: how to enable conditions for successful network governance in the context of dealing with complex problems?</p> <p>Network analysis of the interest rate benchmark reform demonstrated that the presence of substantive and strategic complexities has created barriers to problem-solving. Overcoming these impasses in decision-making can be achieved through network management, either via institutional design or process management. Importantly, managing the complex interaction processes in networks must account for reciprocal influence of the factors that shape the decision-making, which therefore must be translated in the strategic choices of network managers. However, in order to better understand the implementation of network management strategies, a more detailed analysis of interaction patterns and the causal mechanisms behind network management is needed.</p>	
Keywords	interest rate benchmarks, meta-governance, network analysis, network governance

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Glossary

EURIBOR Euro interbank offered rate

FCA Financial Conduct Authority

IBOR Interbank offered rate

IOSCO International Organization of Securities Commissions

LIBOR London interbank offered rate

1 Introduction

Interbank offered rates (IBORs) are an important component of the global financial system. They act as a reference rate to hundreds of trillions of dollars-worth of financial instruments.

The rate-fixing scandal of London interbank offered rate (LIBOR) in 2012 raised significant concern about the integrity and sustainability of systemically important reference rates, leading to a global reform of IBORs, which constitutes a major intervention for both industry and regulators (Schrimpf and Sushko, 2019). A phase-out announcement by the Financial Conduct Authority (FCA) in 2017 incentivized a transition process to alternative reference rates, which revealed the truly complex and uncertain nature of the global undertaking. As a result, the success of what has been referred to as “the largest financial engineering project world has ever seen” is highly reliant on strong collaboration between market participants and the official sector (Deloitte, 2018; Purvis and Harris, 2019).

The case of IBOR reform depicts the growing complexity of contemporary issues, the essence of which has been well captured in the literature of “wicked problems”. The contribution of wicked problems theorists lies in recognizing the incapacity of established frameworks to solve complex, dynamic and diverse problems, thereby highlighting the need for more collaborative solutions for problem-solving in public policy (Koppenjan and Klijn, 2004).

Horizontal cooperation has indeed become a frequent response to problem-solving in the context of growing fragmentation and complexity in contemporary societies (Sørensen and Torfing, 2005). A transformation in the form of social coordination represents a shift from emphasis on social structures towards the importance of resource flows and mobilities (Ball and Junemann, 2012). Growing interdependency between actors and the emergence of new patterns of interaction come together under the notion of networks, which make them an important lens for examining governance systems.

The network approach to governance is believed to provide a strong theoretical base for analysing the complex processes of problem-solving. As a result, the focus on networks in governance research has been gradually increasing over the years. The current state of the literature can be described by its emphasis on network performance, represented by the efforts to understand the mechanics of governance networks, their conditions for success and sources of failure (Sørensen and Torfing, 2005).

Managing interactions in networked environment has proven to be necessary for achieving desirable outcomes in governance networks. The idea of network management has been closely associated with the studies in meta-governance, leading to strong recommendations to combine these branches of literature in order to advance this area of research (Gjaltema, Biesbroek and Termeer, 2019). However, network management and its effect on policy outcomes is difficult to measure and represent, given the reciprocal influence of microlevel behaviour, network structures and macrolevel variables. As a result, the inconsistencies among studies have highlighted the need for enhancing comparative understanding of how different contexts shape capability building in networks (Head and Xiang, 2016).

As a contribution to the literature of network management, exploring the performance of networks is central to this research. Designed as an exploratory case study, this paper aims to study the case of interest rate benchmark reform in order to answer the following question:

- How to enable conditions for successful network governance in the context of dealing with complex problems?

The thesis is divided into six chapters. Chapter one deals with the background of the research, research objectives, rationale for methodology and research question. The following chapter provides a theoretical background of the research area, covering topics such as the origin and essence of governance, network approaches to governance and network analysis. Chapter three provides an overview of research design as well as the methods for data collection and analysis. Moreover, the chapter includes an overview of the case. The analysis in this paper is divided into two sections. Firstly, in order to provide meaningful insight into what constitutes the

complexity of the issue presented in the case study, chapter four demonstrates the wicked context of IBOR transition. Insight into the wicked characteristics of the issue constitutes a base for the analysis and discussion in chapter five, which explains the causes and implications of network governance and explores the role and mechanics of network management as a way of facilitating interactions. Finally, chapter six includes a reflection on the research, summary of results and recommendations.

2 Literature review

2.1 Governance: concept & origin

At a broad level, governance refers to theories and issues related to social coordination and the study of emergent patterns in the governing function (Bevir, 2010). The discussion revolving around new forms of governance has developed from the 1970s onwards, resulting in extensive literature, which covers a wide range of application fields & terminological interpretations via different academic disciplines.

Rhodes (1996) suggests at least 6 different uses for governance: minimal state, corporate governance, the new public management, good governance, socio-cybernetic systems and self-organizing networks. As an example of the contextual variety of the term, it has become widely recognized among scholars that the ambiguous nature of “governance” comes with little benefits when applied in more specific analysis. A persistent vagueness behind the concept of governance has largely been provoked by what Jessop (2003) refers to as a “terminological mobility”. Besides being a poly-contextual notion, governance is subject to different interpretations – empirical and theoretical. The first approach deals with the political and institutional capacity of states to govern in the context of a changing environment. Much of the interest in the governance approach from a practical point of view has stemmed from numerous attempts at public sector reform since 1980s that have led to the development of new designs and practices (Bevir, 2010). Consequently, a certain divergence in the academic work on the framework of governance has emerged: while some see governance as a result of the decline of the state, others perceive such development as an adaptation process of the state to increasing societal complexity.

The theoretical view of governance, on the other hand, has its focus on the coordination of complex social systems with special emphasis on the function of networks, and is a perpetually debatable topic regarding the role of public administration in the “steering” process. A demonstrably multilevel approach to governance has had a notable effect on the state of literature, since the ideas regarding the concept are often transferred between different paradigms, leading to inconsistencies and misunderstandings. (Pierre, 2000)

To further elaborate on the idea of new approach, looking at governance as a form of coordination allows us to make a distinction between other types such as coordination through exchange and imperative coordination, certain weaknesses of which have given rise to new forms of social coordination. Governance is described as a means to balance the goal setting between different actors and coordinate the resource allocation in a more efficient way than other forms of coordination could allow (Jessop, 2003). Looking at governance from the level of social relations (macro, meso and micro levels) adds a degree of complexity to the coordination system. Scholars have made a distinction between interpersonal networks, interorganizational relations and inter-systemic relations, the interactions between which form the overall dynamics of the system (Kooiman, 1993). Consequently, due to its inherent interconnectedness, analysing governance in an isolated manner makes little sense.

Reasoning behind the observed paradigm shift derives mostly from the idea that governments have become unable to solve the demands placed upon them by society, which has become especially evident during crises (financial, regulatory, rationality, implementation, complexity) (Bekkers *et al.*, 2007). Government failure led to a phenomenon, which some academics refer to as “hollowing out the state” – a process where the flow of power upwards to transnational bodies and downwards to subregions results from privatization, efforts to limit the scope of public intervention and an increasing importance of new partnerships and networks that extend beyond the national level (Jessop, 2003; Rhodes, 1996; Kettl, 2002; Rahman, 2016). The paradigm shift places government organizations into exchange networks, which are interdependent and complex, and where the governments’ capacity to steer becomes debatable. In addition, growing social complexity and access to information have been the driving forces behind the transformation that would allow coherence among a variety of actors with distinct interests and objectives. (Pierre, 2000)

2.2 Governance as a system

Governance is a complex process of decision-making that evolves and adapts according to the circumstances (Walters, 2004). Systems exhibit complexity and, therefore, the expedience of the systems theory in the context of governance has become extensively recognized. Systems theory as a means of modelling systems and exploring the principles of organized complexity draws attention to the way the assembly of components and inherent interactions produce order in the system as a whole (Bevir, 2010). As discussed earlier, the multilevel approach to governance demonstrates how tension created by streams of interactions through different levels is ultimately reflected in the dynamics of the system. Drawing from natural sciences and cybernetics, Kooiman (1993) was one of the first to introduce the concept of dynamics in the context of governance, referring to rapid changes that are inherent to a state of any system. The dynamic nature of the system's components that tends to produce unpredictable outcomes in system's behaviour is considered as one of the main sources of complexity (Klijn and Koppenjan, 2014).

Recognition of the complexity in governance practices is believed to reflect the development of more complex societies, which demands innovation in the function of governance (Jessop, 2003). Societal problems arising from high degree of dynamics and the incapacity of established frameworks to address them can transform into what has been referred to as "wicked problems" (Koppenjan and Klijn, 2004). An essentially contested concept and yet widely adopted in the domain of public policy, the notion of wicked problem was introduced in 1967 by C. West Churchman, who defined it as: "a class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (Churchman, 1967, as cited in Termeer, Dewulf and Biesbroek, 2019: 168). Literature on tackling wicked problems has become diverse in nature and significantly more advanced in interpreting the nature of complex social problems than Rittel and Webber (1973), who were among the first to consider the characteristics of wicked problems. As part of possible approaches, wicked problems have been viewed through uncertainties, inherent characteristics of complex-adaptive systems, power and values and other factors (Termeer *et al.*, 2015).

Some view the concept of “wicked problems” as inherently flawed, rejecting its usefulness in forming an analytically precise way to observe problems (Turnbull and Hoppe, 2018). This demonstrates the effort in contemporary literature at reframing the concept. Although the notion of wicked problems has created confusion among scholars, it is suggested that perhaps the concept’s usefulness from a scientific perspective lies instead in its ability to reflect on the nature of the problem, which allows us to examine the underlying assumptions of governance approaches used to deal with them (Termeer, Dewulf and Biesbroek, 2019).

Further, Crowley and Head (2017) note that the importance of Rittel and Webber’s early contribution lies in their recognition of a pluralistic society that demands complex, network-based and more collaborative solutions to problem-solving in public policy. As a result, different governance approaches (e.g. network governance, adaptive governance, interactive governance) have been developed that are potentially capable of tackling the inherent complexity (Termeer, Dewulf and Biesbroek, 2019). Head (2019) further emphasizes that recognizing the dimensions of complexity and uncertainty presents a sensible way for advancing the research on methods for understanding and managing the wicked context of contemporary policy problems.

2.3 Network approach to governance

One way to observe systems is through networks. Networks provide structural insight and allow a powerful method for examining the dynamics of social systems (Johnson, Fortune and Bromley, 2017). Certain features of governance such as hybrid practices, the multijurisdictional nature of “steering” and plurality of stakeholders come together under the notion of networks (Bevir, 2010). Rhodes suggests that networks constitute organizations aspiring to exchange resources and maximize influence over outcomes (1996). As a result, new patterns of interaction have emerged: self- and co-regulations, public-private partnerships, cooperative management and joint ventures. Contemporary governance systems that are characterized by dynamics of complex interconnectedness, fragmentation and growing complexity of societal problems seek new forms of social coordination to address the challenges arising in networked environments (Lewis, 2011). Network theory, as a conceivable approach, has become

in many ways an inseparable part in the discussion of governance, and has boosted academic literature on network governance.

Network approaches to governance are not a recent development. The sheer magnitude of different and often conflicting theoretical and empirical approaches, cross-disciplinary application and disparity in terminology in the literature has left the notion of network governance without a universally accepted definition (Lewis, 2011). Klijn and Koppenjan (2012) suggest that the governance network theory derives from the works within three different research traditions: public policy networks, inter-organizational service delivery and policy implementation, and managing networks. Some have observed that policy networks and network governance overlap in theory and practice (Lewis, 2011; Damgaard, 2006 as cited in Lewis 2011). Lewis (2011) also points out that the network governance theory as we know it today was strongly influenced by a shift in organization theory towards examining interorganizational decision-making from the perspective of open systems.

Despite the differences in the mentioned research traditions, a common feature can be observed – interactions within the network are the key to ensuring desirable policy outcomes and strong performance (Klijn and Koppenjan, 2012). Given the importance of interactions in the formation of distinct governance methods, the network approach has become widely accepted due to its ability to provide a theoretical base for analysing the complex processes of problem-solving in a networked environment (Koppenjan and Klijn, 2004). The upsurge in network governance as a practice and not only as a subject of research clearly indicates the potential. In fact, its popularity relates to the fact that network governance is viewed as a more effective governance mechanism by central decision-makers.

In bringing clarity to the general theory of network governance, the work of Sørensen and Torfing (2005) and Lewis (2011) is noteworthy in providing a thorough summary regarding the disciplines that constitute the theory of network governance and thoughts on possible future research directions. Sørensen and Torfing (2005) bring into perspective the main differences between the first and second generations of network governance research. While the first generation attempted to explain governance networks' novelty, reasons behind their formation and their main differences as opposed to other forms of coordination, the second generation aims to understand the

mechanisms of governance networks, their conditions for success and sources of failure, inherent problems and potentials, and successful management strategies (Sørensen and Torfing, 2005).

Despite its recent popularity as an analytical method, networked governance as a theory and a concept has received substantial criticism. Discussion around the self-organizing capabilities of the network system draws certain parallels with coordination through exchange, which is often presented as a capable mechanism for coordinating complex systems due to self-corrective characteristics (Kettl, 2002). As one of such observations, the fundamental features of the theory of governance have become subject to criticism on the basis of ideological foundations (Walters, 2004). Moreover, as a critique towards the explanatory capabilities of network governance theory, some have challenged its sufficiency in addressing complex societal issues (Dowding, 1995 as cited in Lewis 2011; Termeer, Dewulf & Biesbroek, 2019).

In the discussion regarding the success and failure of the networks as an innovative approach to governance, Jessop suggests four factors that influence the formation of governing mechanisms: simplifying models and practices; developing capacity for interactive learning; building methods for coordinating actions among different social actors; establishing common worldview for individuals; and systems of meta-governance (2003). These elements also represent a possible source of failure of new governance approaches based on networks, the risk of which is addressed under meta-governance.

Meta-governance is often observed under the theory of systems and refers to a governance of governance (Jessop, 2003). Few scholars have tried to address the issue of ambiguity of the term via careful study of meta-governance literature, which has revealed that means of meta-governance are remarkably similar to the means of traditional governmental interventions (Gjaltema, Biesbroek and Termeer, 2019). However, a forthcoming study by Jessop (2020) features just this sort of careful study, as part of a theoretical investigation of the concept of civil society.

While it has been argued that in the presence of self-regulating networks the capacity of government to steer is limited (Kooiman, 1993; Kettl, 2002), some have put the developments of governance into the context of transforming the role of the state

(Pierre, 2000; Schick, 2002). Governments are regarded to have a significant role under meta-governance as providers of ground rules and regulatory order (Jessop, 2003). The importance of the active state has been emphasized due to its significance in addressing dilemmas regarding accountability and liberal representative democracy under the idea of governance (Lynn, 2003).

A vast amount of literature on meta-governance revolves around networks, especially where actors from different domains are present (Gjaltema, Biesbroek and Termeer, 2019). If we look at meta-governance as a tool for network management, the framework of Sørensen and Torfing (2005) proves useful in outlining different forms of meta-governance, distinguished by “hands-off” (network design and network framing) and “hands-on” (network management and network participation). Another way to view meta-governance methods is through their emphasis on either institutional design or process management (Koppenjan and Klijn, 2004; Klijn and Edelenbos, 2007). Essentially, network management refers to the process of steering the interactions with an objective of, for example, enabling and guiding the interactions between actors, (re)organizing the networks to allow better coordination and facilitating institutional learning (Klijn, Steijn and Edelenbos, 2010). Literature on network management has grown exponentially; however, only a limited portion of the research has examined the causality between the management strategies and governance outcomes.

2.4 Network analysis

Research in the field of governance often depicts networks as a means of governing, rather than as a model for analysis. However, networks are, in essence, an analytic device that possesses the potential to describe how things are or how they are changing. Exploring these capabilities has been evidently a key feature of recent literature on governance networks.

There exists a notable variety in the approaches to network analysis. Bodin *et al.* (2011) suggest the following, and a rather general classification of methods employed: implicit network analysis, where specific connections between actors are not considered; structurally descriptive network analysis that emphasizes the characteristics upon which different networks or actors can be compared; and a

structurally explicit network analysis with focus on the arrangement of specific connections. Overall, it has been observed that the research field tends to limit itself to only a few inherent components of networks, nodes and edges, and that the great potential for improvements lies in utilizing multi-layer data that encompasses these additional features. While recognizing the restrictions with respect to feasibility of broader analysis, Scott and Ulibarri (2019) argue that such methodological improvements are necessary in order to extract value from emerging tools and technologies.

Although networks are easy to identify, the effect of the structure and processes of networks in terms of governance outcomes proves to be difficult to measure. Network performance has been an important research topic for decades now, enriched by a great variety of perspectives. As the importance of networking and network management strategies has become evident in enabling collaborative processes in networks (Meier and O'Toole, 2007), some have pursued exploration of the deciding factors behind the selection of network management strategies (Klijn, Meerker and Edelenbos, 2019). Inconsistency among studies on this matter, however, tends to guide our attention to the importance of the subject of governance and that the network characteristics can vary in different domains. In fact, the critical role of the subject in governance research has been emphasized by many (e.g. Debrix, 2013; Jessop, 2003; Koppenjan and Klijn, 2004).

Viewing network management through the lens of meta-governance allows for a more holistic approach for exploring network performance. Meta-governance research is a relatively recent development and requires more insight into the causal mechanisms behind the workings of meta-governance. This means taking into account the context specificity when exploring the conditions under which network management occurs. The in-depth literature review performed by Gjaltema, Biesbroek and Termeer (2019) reveals that it is especially difficult to portray the reason and methods of meta-governance, given the sheer magnitude of variants and combinations that are present in the literature. However, some suggestions for a sensible way forward were made. For example, exploring network management could benefit from studies on process design and management (Klijn and Edelenbos, 2007; Koppenjan and Klijn, 2004). As for the rational, network management is often related to overcoming coordination

problems and failure to reach substantive outcomes, but further research on cause-effect relationships is needed. (Gjaltema, Biesbroek and Termeer, 2019)

3 Methodology

3.1 Research design

In order to explore the capabilities of network governance, this research was designed as an explanatory, process-focused case study, aiming to answer the following:

- How to enable conditions for successful network governance in the context of dealing with complex problems?

The performance of networks is not easy to represent, especially due to great variety of factors that influence the outcomes of network governance. This is particularly the reason behind inconclusive studies on network performance. A boost in empirical studies on network governance over the past 15 years represents the growing recognition of the value that case studies can bring for enhancing the comparative understanding of how different contexts shape capability building in networks (Head and Xiang, 2016; Klijn, Meerker and Edelenbos, 2019).

The functioning of a governance system is essentially concerned with the nature of interactions between actors in that system, which therefore was the unit of analysis in this research. In order to fully understand the nature and dynamics of these interactions in the case, the analysis was divided into multiple chapters. Firstly, drawing on the literature of wicked problems, the research aimed to provide meaningful insight into what constitutes the complexity of the issue presented in the case study. Further, the causes and implications of network governance were explained through implicit network analysis, which allowed to elaborate on the potentials of network governance for dealing with wicked context of contemporary issues. Finally, the study explored the role and mechanics of network management as a way for facilitating interactions.

3.2 The case

3.2.1 LIBOR

LIBOR is a benchmark rate first published by British Bankers' Association (BBA) in 1986 (Ashton and Christophers, 2015). The definition as well as meaning of LIBOR has been interpreted in various ways. Financial Times (2012) defines LIBOR as follows:

The daily London interbank offered rate is the collective name for a set of key benchmark rates that reflects how much it costs banks to borrow from each other in various currencies. It is the reference rate for about \$350tn of financial products from home mortgages to credit cards – meaning that small moves up or down in the reference rate can have significant knock-on effects in the economy.

LIBOR represents an average value of the interest rate, which is calculated based on the estimates submitted by the leading global banks. Since 2014 the LIBOR is administered by the Intercontinental Exchange (ICE), which is responsible for calculating and publishing the rate each day. The panel of LIBOR consists of 11 to 18 banks that contribute to each currency that LIBOR is compounded by (Swiss franc, euro, pound sterling, Japanese yen and US dollar) at seven different maturities. Each morning the ICE Benchmark Administration asks the panel banks to submit their estimated borrowing costs. The methodology of LIBOR is simple - after trimming the upper and lower values of the input data, the published rates for each currency are determined via the arithmetic mean of respective values. (The ICE, 2019; Kurt, 2019)

3.2.2 Libor scandal

An unusual behaviour of LIBOR became evident in 2007, when the transparency of the rate-setting came under questioning (Fields, 2014). Although market observers were claimed to be aware of the manipulative activity already in 2008, the scandal escalated in 2012, when Barclays admitted to misconduct related to manipulating the daily setting of the LIBOR and EURIBOR (The Economist, 2012). Global financial institutions came under investigation for colluding to manipulate the LIBOR rate as it had been discovered that the manipulation of benchmark interest rate had become a part of business-as-usual in the global financial market (Stenfors and Lindo, 2018). Not only were the banks believed to underreport their borrowing costs to appear financially

healthier, but they were also suspected to realize gains on LIBOR-linked contracts. (Hou and Skeie, 2014)

The involvement of bankers in financial misconduct became evident with the release of emails and phone records, where the traders would ask to set the rate at an amount that would benefit their trading position (Jones, 2019). Conclusive statistical evidence on LIBOR manipulation is scarce, although a few scholars have tried to examine irregularities in the LIBOR movement through interest rate spread analysis and raw interest rate time series (Bariviera *et al.*, 2015).

Tracing the roots of the manipulative activity addressed in this thesis has led to identifying a few key components of the LIBOR scandal. LIBOR is a representative of the unsecured interbank lending market, the lack of liquidity in which has become of main concern to regulators (FCA, 2020). Moreover, the benchmark based on the estimated submissions provided by market participants was determined in a self-regulating system, which left it vulnerable to industry manipulation (Fields, 2014). Andre Spicer also points out that the rate fixing was enabled through networks, which provided social infrastructure comprising of traders, institutions and even the regulators who disregarded the issue at the time (Fields, 2014). Further, Ashton & Christophers (2015) link the LIBOR scandal to the contradiction in the index itself – namely the fact that LIBOR’s presumed neutrality is merely a representation of goodwill of a few influential banking conglomerates, given their role in the construction of the index.

3.2.3 Restoring the integrity of interest rate benchmarks






Robust interest rate benchmarks are vital for sustaining financial stability (FSB, 2018). As a response to the weaknesses identified in the construction of the interest rate benchmark, the insufficiently active market that it seeks to measure, as well as diminished trust of people in financial services, the FCA has announced that after year 2021 it will no longer compel banks to submit to LIBOR (Fields, 2014; FCA, 2017). As a result, global interest rate benchmark reform has been initiated, which is seen as a crucial step towards strengthening the global financial system (FSB, 2018).

Transitioning away from LIBOR and other IBORs is an enormous undertaking for the industry and the regulators alike. In the summary provided by PwC (2018), the following outputs are recognized as the prerequisites for the successful IBOR transition:

1. Designation of robust alternative reference rates to replace IBORs
2. Revisited contract provisions, especially with respect to fallback language
3. Term rate representations of alternative indices

As part of the international effort in reforming the interest rate benchmarks, working groups for each IBOR currency have been established to nominate the alternative risk-free reference rates (RFRs) that differ in their composition and methodology as opposed to IBORs (see Table 1). Namely, the RFRs are based on the actual transactions that stem from liquid underlying markets. (Oliver Wyman, 2018)

Table 1. Overview of preferred alternative rates (Modified from source: Deutsche Bank, 2019)

Jurisdiction	Alternative RFR	Administrator	Nature	Transaction based	O/N rate	Underlying Transactions	Rates Published
	€STR	European Central Bank	Unsecured	Yes	Yes	Money markets	October 2019
	Reformed EURIBOR	European Money Markets Institute		Partly			
	SONIA	Bank of England	Unsecured	Yes	Yes	Money markets	April 2018
	SOFR	Federal Reserve Bank of New York	Secured	Yes	Yes	Repo transactions	April 2018
	SARON	Swiss National Bank and SIX Swiss Exchange	Secured	Yes	Yes	Repo transactions	August 2009
	TONAR	Bank of Japan	Unsecured	Yes	Yes	Money markets	July 1985

However, the shift to the alternative rates introduces a variety of concerns – some of the most significant are variations in the development plans and methodologies as well as lack of collaboration of the working groups on an international level, and weak coordination on behalf of regulatory bodies (ISDA *et al.*, 2018a). Market participants with high exposure to LIBOR are expected to face significant risks and administrative burdens from the transition. The efficiency of the transition, however, does not rest on the internal capacities alone – availability of the alternative rates, liquidity of the

underlying markets, supporting market infrastructure and enabled synergy are some of the external factors that play a similarly important part in producing the anticipated outcomes. (Oliver Wyman, 2018)

3.3 Data collection for case study

Literature presenting the ongoing transition process is relatively scarce. The discussion has relied mostly on the official statements (FSB, 2018; FCA, 2020) or the reports and surveys published by the Trade Associations that aimed to raise the awareness of the issue among market participants (ISDA et al., 2018a; 2018b). However, these publications can represent a way for framing the problem, which presents a possible limitation to this research. Other sources of information were, for example, reports and articles released by consulting firms and finance magazines.

Analytical insight into the causes of the problem and possible solutions was supported through the exiting literature on benchmark manipulation. Not only as a constraint to the ongoing research but as an important finding in the context of analysis, the state of research indicates that benchmark manipulation as a form of market abuse has gone almost completely unstudied. Further, the research on the LIBOR scandal reveals rather different opinions on the nature of the problem. Nevertheless, the variety of conclusions reached via scientific research in itself was a useful discovery in the context of this study.

3.4 Methods of analysis

A subject (system-to-be-governed) in governance research is of great importance and in order to fully understand the complexity of the problem presented in the case, this paper utilizes the literature of wicked problems to map out the characteristics of the issue that need to be addressed in order to efficiently manage the problem. However, the aim of this paper is not to frame the policy issue as a wicked problem but rather use it as a tool for unwrapping the true nature of the problem, and critically assessing the quality of a governance approach in dealing with the wicked characteristics of the issue. This approach is guided by the recommendations on more useful utilization of the concept that allows to draw more meaningful links to the analysis of governance

methods (Termeer, Dewulf and Biesbroek, 2019). Therefore, the analysis of the problem has been narrowed down to characteristics of uncertainties and system complexity (Head, 2019).

Governance networks are believed to have the potential for managing wicked characteristic of contemporary policy problems due to enabling collaborative arrangements. Using implicit network analysis where the author posits the existence of networks, the causes and implications of network arrangements were analysed in the context of the case study. While a binary metaphorical approach does not say much about the patterns of social networks, and therefore, can be lacking in explanatory capabilities, the approach is useful for mapping out the role of resource flows with respect to collaboration within the network (Scott and Ulibarri, 2019). The study is concerned with a network formed in the aftermath of LIBOR scandal, the boundaries of which have been further determined by the involvement in IBOR transition, and by that implying the application of an event-based sampling strategy (Nowell *et al.*, 2018). Besides, an event or crisis has been found as a useful starting point for performing a network performance analysis (Ball and Junemann, 2012).

Finally, using the framework proposed by Koppenjan and Klijn (2004), the research expands on the literature of meta-governance to explain possible methods for facilitating interactions in networks. The work of these authors continues to be a well-recognized approach to network management that connects both institutional and interactionist traditions of the literature (Gjaltema, Biesbroek and Termeer, 2019). Besides, Koppenjan and Klijn (2004) recognize the importance of subject in governance processes by incorporating that aspect into their approach for dealing with key characteristics of wicked problems.

4 Wicked context of IBOR transition

LIBOR scandal has led to a highly complex collaborative initiative of redesigning certain aspects of interest rate benchmarking (Strimling and Talley, 2014). Given the vast scale of the IBOR transition and significant challenges associated with the undertaking, the success of the reform is highly reliant on strong collaboration between market participants and the official sector (Deloitte, 2018).

In this section, the current policy issue is described through the lens of wicked problems in order to deconstruct the matter of IBOR transition and allow an in-depth view into its complexity. While the risks of treating the policy issue as a wicked problem have been considered, examining the IBOR transition through the characteristics of wicked problems protects it from oversimplification and enables a critical analysis of how the vulnerabilities of financial indices have been currently addressed (Termeer, Dewulf and Biesbroek, 2019). Therefore, in this paper, the framework of wicked problems is viewed as a means for understanding the level of problemat�city, which in turn allows a foundation for analysing the capabilities of a governance approach for tackling the wicked context of policy problems.

To simplify the fundamental conditions of wicked problems proposed in the famous article by Rittel and Webber (1973), Roberts (2000) suggested the following: generally, wicked problems lack consensus on the problem definition and solutions. A dimension of uncertainty is often presented as a salient feature of dealing with the wicked problems, and in the case of IBOR reform this has been especially evident. Uncertainty on its own, however, rarely constitutes a wicked problem – the level of complexity of the system is just as important when evaluating the degree of wickedness in a problem (Head, 2019). Therefore, rather than relying on Rittel and Webber’s original 10 conditions that are believed to yield controversy in approaching a wicked problem, the reform of the interbank benchmark rates will be described through the dimensions of complexity and uncertainty.

4.1 System complexity

In exploring the complexity of wicked problems, one might refer to complexity in elements, subsystems and interdependencies that yield complex patterns of interaction in the system (Head, 2008). The complexity inherent to wicked problems is often embedded in the underlying cause of the problem, or the fact that the problem might be a symptom of another problem (Peters and Tarpey, 2019). Restoring the integrity of interest rate benchmarks has proven to be a challenging undertaking due to the unique role of LIBOR and its inherent characteristics that make it especially vulnerable to manipulation. Besides, a closer look into the relatively unexplored landscape of

financial indexing reveals that the interbank offered rates are by no means the only indices subject to risk of manipulation.

4.1.1 Role of LIBOR

LIBOR has become a globally accepted benchmark interest rate. Its rapid growth has been associated with the development of Eurodollar market in 1950s and 1960s (Stenfors and Lindo, 2018). However, the divergence from the underlying market due to greater connections with the rapidly growing market of derivatives has changed the true purpose of the interest rate benchmark. LIBOR has significantly grown in importance as its role in the global financial system has become more profound and complex.

LIBOR has two primary use functions. Firstly, it is a reference rate that is used to determine individual interest rates for roughly \$300 trillion worth of financial instruments, including derivative contracts, mortgages, car loans, student loans and other financial products (Jones, 2019). Secondly, as a benchmark rate, LIBOR constitutes a performance measure. It is argued, however, that the role of LIBOR is much deeper than representing the market expectations. Ashton and Christophers (2015) treat LIBOR as a technology of arbitration, highlighting the blending and binding function that LIBOR fulfils in global finance, which in turn demonstrates the inherent interconnectivity that is enabled through financial indices.

Although LIBOR is one of many financial indices, it does have unique characteristics as an information instrument. In their taxonomy of financial indices, Rauterberg and Verstein (2012) proposed the following classification: public indices, product indices and by-product indices. LIBOR and other IBORs can be categorized as by-product indices, a group that can be vulnerable to very different types of risks as opposed to other categories. Importantly, by-product indices are not an end-product themselves, as they are only facilitative in nature. Consequently, the producers have little interest in maintaining the quality of these indices (Chiu, 2015). From a somewhat different perspective, Chiu (2015) classifies benchmark reference rate as a “primary plus secondary use benchmark”, which is easy to redistribute and where producers have no incentive to restrict such dissemination, noting that these types of benchmarks are inherently susceptible to free riding.

Given that LIBOR is deeply rooted in the financial system, the effect of the benchmark interest rate manipulation on the economy can be substantial. Besides providing incorrect information on the true interbank lending costs, misreporting of LIBOR produces a corrupt key variable in the first stage of the monetary transmission mechanism (Stenfors and Lindo, 2018). And considering the influence of the money market functioning over the decision-making in monetary policy, LIBOR does not only reflect the health of firms and financial markets but serves as a critical referent for the stability of national banking systems (Bariviera *et al.*, 2015).

4.1.2 Vulnerability of financial indices

Although the integrity of financial indices was brought to public attention due to manipulation of subjective indices such as LIBOR, the debate has extended beyond those to transaction-based indices. Essentially, the transition of interbank offered rates to alternatives implies the adoption of transaction-based index construction methodologies, which are considerably more reliable (Deloitte, 2018). While indices based on the actual transactions are indeed more robust, changes with respect to the nature of the input data do not eliminate the risk of manipulation. For example, Verstein (2015) demonstrates how entirely “objective” benchmarks can be susceptible to manipulation. That study highlights the inherent conflict of interest that lies in the value chain of the benchmark industry (see Figure 1). Typically, the incentive for benchmark manipulation can arise in the situation where the index administrator is also the product issuer or an end customer, allowing for a potential benefit from the development of the index values it provides. (STOXX, Deutsche Börse and SIX Group, 2013)

The importance of the index industry lies in the substantial benefits it provides. Financial indices are believed to allow for more transparent markets, enable diversification of investments as well as support decision-making and facilitate performance measurement. Given that all benchmarks share similar vulnerabilities that can potentially undermine the mentioned benefits, there is a need for a framework that applies to all benchmarks (Fields, 2014). Introducing an overarching solution should be mainly concerned with ensuring the reliability and traceability of index provision and addressing the conflict of interest in the index industry. Importantly, however, addressing these vulnerabilities should not undermine the incentives to develop index innovation. (STOXX, Deutsche Börse and SIX Group, 2013)

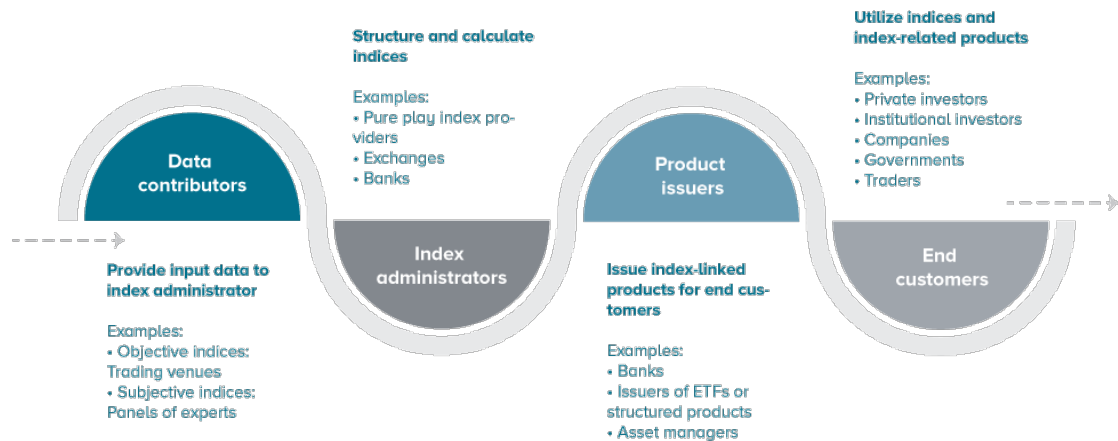


Figure 1. The benchmark industry value chain (Modified from source: STOXX, Deutsche Börse and SIX Group, 2013)

4.2 Substantive, strategic and institutional uncertainty

Uncertainty embedded in complex problems derives from risks, consequences of actions and changing patterns (Head, 2008). Koppenjan and Klijn (2004) suggest three forms of uncertainty that can arise in a networked society: substantive, strategic and institutional uncertainty. The case of IBOR transition also demonstrates how divergence in viewpoints and strategic intentions derives from the uncertainty while also adding to it.

4.2.1 Substantive uncertainty

Substantive uncertainty refers to the nature of the concerns, and which can derive but is not limited to the availability of information (Koppenjan and Klijn, 2004). Sometimes the available information is interpreted differently, which results in unclear status of the knowledge. Uncertainty about the nature of the problem can also spring from the plurality of the variables and their mutual relations or inability to determine the degree of seriousness of a problem and the effectiveness of a proposed solution.

An exponential growth in the financial benchmark industry has been overlooked by both academics and regulators. Benchmarking as a practice has become widely

adopted due to various benefits, which has been accompanied by an incremental growth in the authority of index providers. The function of the indices, their construction methodologies and inherent risks have gone almost completely unstudied, which echoes in the somewhat turbulent nature of initiatives that have been established to address the belatedly recognized vulnerabilities of financial indices.

The fact that benchmark manipulation has not been viewed as a dominant form of market abuse has become particularly obvious. Benchmark manipulation has been observed to have specific characteristics that tend to deviate from traditional types of market manipulation and, therefore, require a different approach. While changing the way interest rate benchmarks are calculated can lead to more robust indices, Rauterberg and Verstein (2012) argue that it does not eliminate the risk of manipulation. In exploring the essentially subjective nature of financial indices, these authors have recognized the central role of benchmark administrators who are ultimately responsible for balancing the accuracy of index against its other legitimate goals (Rauterberg and Verstein, 2012; Verstein, 2015). The importance of benchmark administrators is further emphasized in the conflict of interest that is inherent to the benchmark industry. These issues have not gone unnoticed by the regulators. However, the overarching framework of Principles for Benchmarks by the International Organization of Securities Commissions (IOSCO) leaves room for interpretation on the matter of self-indexing (STOXX, Deutsche Börse and SIX Group, 2013).

The effectiveness of a proposed solution to adopt alternative reference rates remains obscure. Conflicting points of view regarding the nature of changes applied to the IBORs are evident. The exposure of LIBOR manipulation in 2012 was followed by a significant academic debate over the sustainability of LIBOR. The opinions ranged from abandoning LIBOR to establishing new methods for LIBOR calculation (Pascall, 2016). Allegedly, there is no perfect replacement for the scandal-hit benchmark given its uniqueness (Wheatley, 2012). New products using alternative reference rates will not be economically equivalent to the ones based on LIBOR because the bank credit risk will no longer be embedded in these rates (Oliver Wyman, 2018). Risk-free reference rates developed to replace IBORs evidently struggle to fulfil the needs of all markets and relevant financial instruments that are exposed to LIBOR.

Moreover, the true exposure of LIBOR is difficult to estimate, which makes planning for the transition especially complicated for all the parties involved. In the absence of a coordinated strategy, the uncertainty over the possible outcome stems from the potential risks to financial stability that might accompany a disorganized transition to alternative rates (ISDA *et al.*, 2018a).

4.2.2 Strategic and institutional uncertainty

Strategic complexity refers to a situation where variety of strategies develop around a complex problem, often without actors realizing it. The strategic choices can become conflicting, especially when the actors of the network are autonomous. These choices, however, do not occur in a vacuum - institutional characteristics of decision-making become especially important in understanding the actions of the actors. Therefore, institutional uncertainty can be characterized through different perceptions, objectives and interest. (Klijn and Koppenjan, 2014)

Transferring to new alternative reference rates has encountered some opposition, which in turn is expected to hinder the anticipated progress of the transition. This is reflected in the reluctance by some market participants to adopt the replacement rates due to financial burden it carries. Further, the uncertainty itself possesses a risk of becoming an excuse for inactivity for financial firms (Oliver Wyman, 2018). This in turn affects the knowledge of whether the LIBOR will exist post-2021 and what sort of consequences this might entail (ISDA *et al.*, 2018a; Risk.net, 2018). Consequently, it has become clear that not all actors have a similar understanding regarding the urgency and the meaning of the problem.

The inconsistencies are also present across jurisdictions. For example, the divergence in regulatory response brings additional conflict and complexity into getting a grasp of the issue. The conflict stems mostly from the European Union's response to the manipulation with an overarching European Benchmark Regulation (EBR). Verstein (2015) argues that proposals to regulate benchmarks show that authorities misunderstand the mechanics of benchmark manipulation. In fact, overregulation can potentially hinder the innovation in the industry and pose unequal demands on benchmark administrators. Further, it has been argued that a top-down approach is inefficient in preventing unethical behaviour associated with the benchmark

manipulation, noting that a holistic approach should not cover only the workings of specific benchmarks but also macro institutional aspects of the banking sector (Batten, Lončarski and Szilagyi, 2017; Miller, 2014). Discrepancies on the international level are further illustrated by the varying nature of the transition plans among working groups that have been established for each IBOR currency, which has led to in an industry-wide belief that the project is stagnant due to lack of cooperation at an international level.

5 Network governance approach to IBOR transition

In this chapter, the efforts to restore the integrity of interest rate benchmarks is viewed through the lens of networks. Prescriptive analysis is applied in order to identify conditions for network emergence, present the implications of a network approach and discuss the means for enhancing the capabilities of the governance system.

The governance network formed in the aftermath of the LIBOR scandal is described through the characteristics introduced by Sørensen and Torfing (2005), who define network governance as: a horizontal articulation of interdependent, yet operationally autonomous actors; who interact within a framework that is to certain extent self-regulating; and which contributes to the production of public purpose. Insight into the unique features of the network, supported by the reflection on wicked context of the undertaking, allows to demonstrate the effects of network governance on decision-making. The analysis is centred on the framework provided by Koppenjan and Klijn (2004) due to its usefulness as a tool for describing the quality of network management. Besides, this enables a base for further discussion on how to enable conditions for successful network governance.

5.1 Network emergence: collaboration at the core

Networks can thrive under different conditions. Commonly, networks arise in situations when markets and hierarchies fail, where trust and resource dependency describe the relationship between parties involved, or where management is grounded on negotiations (Bevir, 2006).

The literature on wicked problems is successful in recognizing how the tendency of complex social issues to span boundaries enhances the need for a governance approach that recognizes the interdependency inherent to complex systems and that enables collaboration across sectoral boundaries (Head, 2019). Approaching complex policy issues is often accompanied by a mentality of “coping” or “managing” rather than conclusively solving the problem. Managing the wickedness in problems is often about addressing the value divergence, which, therefore, explains the eligibility of governance networks as a response to wicked problems (Head and Alford, 2015). Governance networks as platforms for collaboration enable arrangements that facilitate interaction, cooperation and learning between different parties (Koppenjan and Klijn, 2004).

Collaborative arrangements for dealing with complex problems are necessary for several reasons. The presence of a wide array of actors enables a potentially better insight into the nature of the problem due to necessary information, arguments and assessments that are being provided across network (Sørensen and Torfing, 2005). Moreover, joint responsibility increases the likelihood of reaching a shared understanding of the nature of the problem and its underlying causes, which in turn increases the chances of agreeing on a solution and facilitating the implementation. Therefore, governance network, as a flexible and adaptable approach to problem-solving, facilitates incremental progress that is enabled through evolving collaboration. (Head and Alford, 2015)

5.1.1 Collaborative arrangements in IBOR transition

This is not the first time global financial system has experienced a major shift in the benchmark reference rates. Back in the 1980s, a significant market-led initiative was set to transition towards methodologically different sets of interest rate benchmark (Schrimpf and Sushko, 2019). This time, however, the process of the reform exhibits a public-private effort. The nature of the transition clearly indicates that there is no single private or public institution that would be capable of delivering this large-scale undertaking alone (ISDA *et al.*, 2018a).

The interdependency inherent to networks stems from common interests and concerns about the future (Kooiman, 1993). Although the concern regarding the vulnerabilities of financial benchmarks was expressed by market participants, the official sector has

become strongly involved in the effort of restoring the integrity of reference rates, considering that the private sector faces significant coordination challenges in this field. That derives from a recognition that benchmark reference rates have strong public good properties, given the unique characteristics of LIBOR as a by-product and its entrenched nature in the global financial markets (Dudley, 2018). Although by nature the IBOR type benchmarks are not a public good *per se*, there are certain benefits brought by the adoption of these benchmarks that are of interest to regulators, who would wish these benefits to be protected (Chiu, 2015).

IBOR type benchmarks have a broad market footprint across jurisdictions. The significance of the ongoing reform springs from a widespread use of LIBOR linked products by various market participants (see Figure 2). Mutually dependent on their resources and capacities, a large variety of actors has come together to configure best solutions, align the intentions and develop coherent transition plans. The need for education and devotion of resources across market sectors for developing an overarching response to weakened reference rates has been a driving factor behind the interaction between supervisors, administrators, global standard-setting bodies, industry organizations and market participants (PwC, 2018).

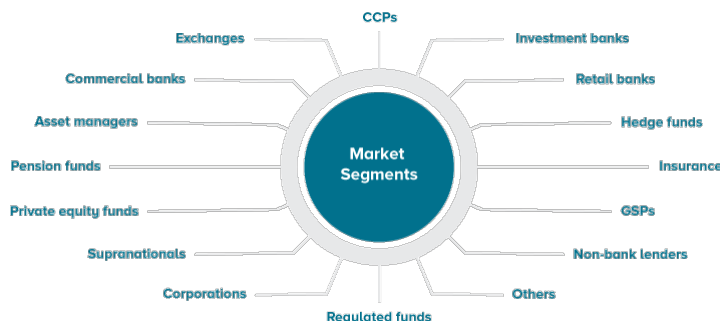


Figure 2. Example of widespread use of IBORs (Modified from source: ISDA *et al.*, 2018b)

Concern about the practices in benchmark industry has gained the attention of various regulatory bodies. In response to benchmark rate scandal, the importance of addressing the self-regulatory nature of benchmark setting was brought to attention by the Wheatley Review in 2012 (Wheatley, 2012). Published recommendations have strongly guided the establishment of regulatory frameworks for the benchmark industry and several initiated reforms to the rate-setting (Chiu, 2015). The Financial Stability

Board (FSB), an international body that monitors the development of benchmark governance regimes, has been responsible for conducting a review of interest rate benchmark and plans to reform these, with an aim of ensuring consistency in the planning process (ISDA *et al.*, 2018b).

Some of the key regulatory initiatives undertaken in recent years present tangible steps that have been crucial in enabling progress. In July 2013, IOSCO published overarching Principles for Financial Benchmarks, addressing benchmark governance, quality and accountability issues (OICU and IOSCO, 2013). The release of guiding principles by IOSCO and FSB has further driven regulatory changes around the world, including the United Kingdom, European Union, Canada, Hong Kong, and Singapore (Kendall, 2017). Chiu (2015) suggests that the nature of the proposed regulatory frameworks demonstrates the desire of policymakers to sustain market stability while preserving the essence of financial benchmarks as a market good. In practice, certain adjustments to the methodology and administration of LIBOR were made following the recommendations set out in the Wheatley Review. Despite the efforts to improve benchmark rates in recent years, lack of any urgent implementations required the revival of the reform process since the main sources of vulnerabilities were still present (Dudley, 2018). The global reform gained momentum in 2017 when U.K. regulators announced their intentions to phase out the rate by 2021, triggering somewhat chaotic processes in solution-seeking that further revealed the complexities of the reform and underscored the interdependency of actors in this global undertaking.

The official sector has been involved in various aspects of the reform: improving the interbank offered rates governance regime, developing guiding principles for ensuring robustness of reference rates and promoting the development and adoption of the alternatives (Dudley, 2018). Guiding markets in desired direction is important, especially since market design has proven to be insufficient in preventing benchmark manipulation (Duffie and Stein, 2015). Nevertheless, the function of financial benchmarks should be shaped by the market (Chiu, 2015). Therefore, the role of the official sector lies primarily in providing a purpose to the network, rather than commanding it, which highlights the relatively autonomous nature of the network actors. The transition is indeed dependent on the actions of market participants, whereas the authorities are in support function (ISDA *et al.*, 2018a).

The autonomous position of actors is further emphasized by significant discrepancies at the international level. Public-private working groups have been established in each regional jurisdiction to identify and develop alternative reference rates. However, the transition plans vary across currencies and in some jurisdictions the plans to transition are in fact non-existent, which represents a considerable obstacle for a smooth transition process. Therefore, global coordination between the RFR working groups, that some find to be a responsibility area of FSB's Official Sector Steering Group (OSSG), is highly recommended by the market participants (ISDA *et al.*, 2018a). (FSB, 2018)

Creating mutual understanding and facilitating learning in deliberative process is an important aspect of network governance (Sørensen and Torfing, 2005). In current stage of the project, the emphasis lies on identification of both challenges that market participants face and possible solutions going forward. For example, the involvement of Trade Associations has been considered necessary to promote better exchange of opinions (ISDA *et al.*, 2018a). Further, to address the development of most important features in alternative reference rates, the FRF working groups have been involving a more diverse mix of market participants (ISDA *et al.*, 2018b). As part of the effort to address challenges related to outstanding legacy contracts referencing LIBOR, the International Swaps and Derivatives Association (ISDA) has launched a market consultation to improve fallback provisions based on the feedback from market participants (Garcia and Schneider, 2018). These steps have certainly the potential to enable incremental progress in the global reform.

5.2 Decision-making in networks

Problem-solving in networks is usually an erratic process, where the outcomes are an aggregate of interactions between actors that essentially influence the problem formulation and solution-seeking to a specific issue. A series of rounds that constitute this complex decision-making process can be described through impasses and breakthroughs (van Bueren, Klijn and Koppenjan, 2003). Attempts to address the vulnerabilities of reference rate benchmarks have similarly exhibited varying success. Despite the tangible steps taken by the network actors and evident progress in decision-making since the LIBOR scandal, the global transition to RFRs has revealed

the truly complex nature of the system, which has resulted in somewhat stagnant reform process. In order to bring some perspective into the quality of network management, this paper utilizes the analytical framework proposed by Koppenjan and Klijn (2004) to explain impasses and breakthroughs through social, cognitive, institutional and network management factors (see Figure 3).

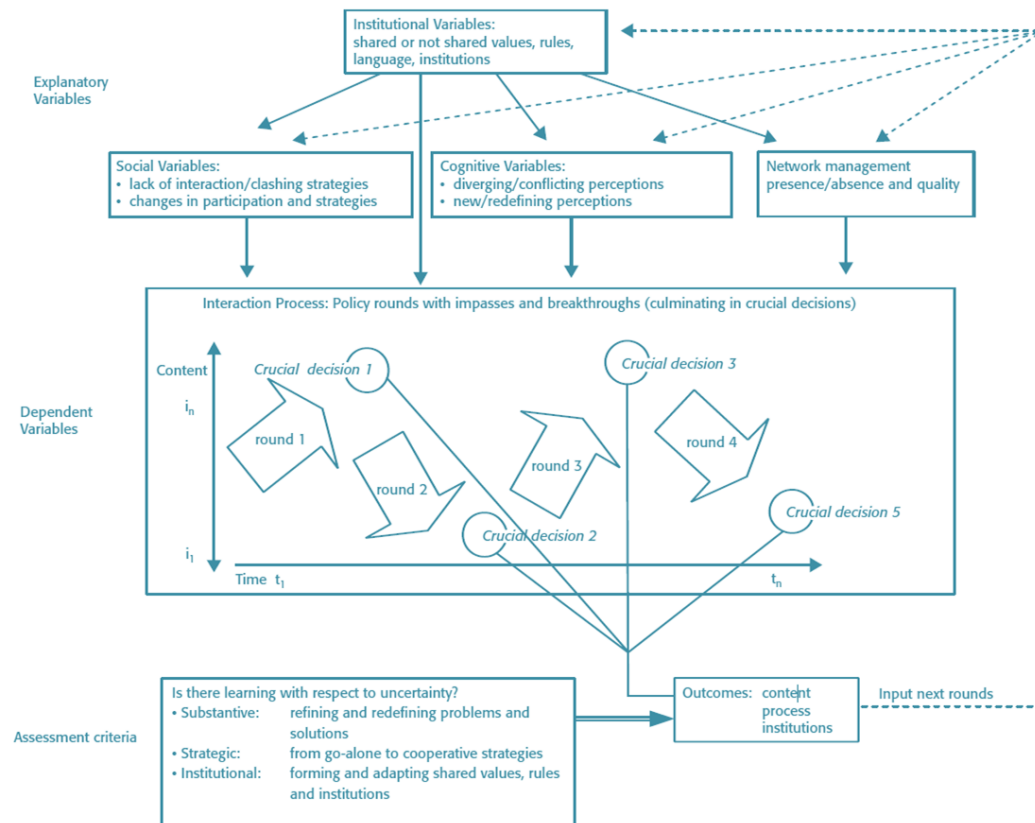


Figure 3. Problem-solving as a policy game in a network context (van Bueren, Klijn and Koppenjan, 2003)

In the presence of complexity and uncertainty, network processes aimed at dealing with policy issues can face stagnation or blockages. Impasses can result, for example, from different perceptions, conflicting interest or strategies, or loss of interest in an issue (Klijn and Koppenjan, 2014). In their conceptual framework, Klijn and Koppenjan argue that network management crucial for preventing impasses and inducing breakthroughs resulting from substantive, strategic and institutional complexity (van Bueren, Klijn and Koppenjan, 2003).

From a cognitive perspective, stagnation can result from varying perceptions about the nature, causes and effects of the problem and their solution. Different perceptions regarding the seriousness of the IBOR transition have become evident, as market participants have made little effort to engage in preparation processes. Considering that certain features of RFRs are still under development, the transition is surrounded by additional doubts and uncertainty. It is especially unclear how to address the key differences between IBORs and RFRs (ISDA *et al.*, 2018a). Dealing with such ambiguity and differences in opinions presumed focus on the convergence of the perceptions and the development of mutual understanding. Although the network formed around the issue is large, comprising many actors from different organizational backgrounds, the issue does not necessarily stem from variety of perceptions but rather an absence of joint frame of reference. (Klijn and Koppenjan, 2014)

Further, lack of clear sense of direction in the transition can originate from different desired end states that are being pursued for different IBORs in different jurisdictions (ISDA *et al.*, 2018a). While the transitioning to alternative rates, the development of which faces significant disparity across currencies, is a preferred option, some actors are still actively engaged in strengthening the methodology of IBORs (FSB, 2018). The absence of coordinated strategy has resulted in different perceptions about the urgency of the transition and great disparity in the behaviour of network actors that inhibits further progress. Stagnation emerges because the strategies of actors whose resources are of great importance are uncoordinated and lack the necessary interaction. Therefore, breakthroughs can be achieved through reducing the strategic uncertainties (Koppenjan and Klijn, 2004).

The state of decision-making in network is often attributed to the quality of network management. Managing complex interaction processes is essential for enabling collaboration between actors. Recognizing the connection between substantial, strategic and institutional complexities is important when dealing with impasses in decision-making, indicating that the efforts to address each underlying factor should not be isolated from one another (Klijn and Koppenjan, 2014).

5.3 Network management: enabling collaboration

From the perspective of wicked problems, the governance system should be capable of dealing with multiple frames in networks and the essentially dynamic nature of decision-making. Xiang (2013) argues that a fundamentally social nature of dealing with complex problems assumes a process-oriented approach that enables participation and collective learning. However, collaborative processes in networks do not just happen. It is argued that network management is crucial for enhancing the capabilities of network governance (Klijn, Steijn and Edelenbos, 2010). Due to uncertainties present in complex problem-solving, reinforcing interactions between stakeholders is critical for enabling desirable outcomes in the network processes. Therefore, the role of network management lies in initiating, guiding and facilitating interactions between interdependent actors in order to achieve conditions for successful collaboration within networks (Klijn and Edelenbos, 2007).

Creating the conditions for success and addressing the failures of a governance system is discussed under the literature of meta-governance. As a tool for network management, meta-governance refers to a practice of using different instruments, methods and strategies to enable success in networks (Gjaltema, Biesbroek and Termeer, 2019). Network management strategies are often distinguished by their emphasis on either on institutional design or process management. However, the deployment of network management strategies is rather subject-oriented, making it difficult to elaborate on what exactly influences the strategic choices of network managers (Klijn, Meerker and Edelenbos, 2019).

From a practical point of view, examining the nature of impasses can be useful for identifying possible approaches for dealing with cognitive, social and institutional factors that influence the decision-making in networked environment (van Bueren, Klijn and Koppenjan, 2003). With special emphasis on the role of knowledge in stimulating the performance of networks, the following sections aim to reflect on the nature of stagnations identified in the case study in order to generate a discussion around possible strategies for dealing with interrelated factors that influence the outcomes of network governance.

5.3.1 Institutional design

Institutional design refers to adapting or creating new institutional provisions, depending on the circumstances. Fundamental changes in institutional design are based on the assumption that they will influence social relations within network (Klijn and Edelenbos, 2007). However, attempts to steer can result in significant consequences. Shifting the balance that has been shaped by various social values over a longer period of time is not that easy and such interference must account for a likelihood of resistance (Koppenjan and Klijn, 2004).

Rules are an important part of networks, which give them an institutional meaning (Klijn and Edelenbos, 2007). Changes in rules can lead to different interaction patterns that formulate different solutions – that is what Torfing *et al.* (2012) refer to as the “ability to shape and secure a particular outcome”. Network design is especially important in the early phase of network formation, but it can also contribute to shaping strategic behaviour and content through subsequent adjustments to institutional design (Torfing *et al.*, 2012). Some of the fundamental changes implemented in the aftermath of the LIBOR scandal can be attributed to just this sort of rational. The strategies for changing rules can be distinguished by their aim at network composition, outcomes or interactions. Changes in composition are often concerned with influencing the processes of network formation and membership, which can involve changing the power relations between actors. In addition, the changes can relate to reward structure, evaluation system, professional codes, etc. Adjusting the arrangements that regulate the interactions of actors can also be an example of rule changing strategies. (Koppenjan and Klijn, 2004)

Sometimes, more fundamental changes are needed to form the perceptions of actors. This is especially evident when the views of participants are entrenched to an extent that they inhibit innovative solutions. As an indirect approach to network management, network (re)framing allows for critical changes in actors’ perceptions through the formulation of political objectives, resource allocation and storytelling (Sørensen and Torfing, 2005). Reframing can also be focused on major plans or striking events, such as the FCA’s phase-out announcement in 2017 that highlighted the urgent need for joint action (Koppenjan and Klijn, 2004). It is important to note, however, that the

reframing strategies can be interpreted very differently by other actors, which sometimes results in unintended consequences.

Trust plays an important part in forming the willingness of parties to cooperate. It is believed to yield a safe environment for solution-seeking and enable mutual adjustment. Trust can also reduce strategic and substantial uncertainties by enhancing the process of mutual learning (Kooiman, 1993). Certain strategies of institutional design can contribute to the building of trust, such as conflict regulation mechanisms. However, trust can also be lost very quickly, with serious consequences for the interaction in networks. (Koppenjan and Klijn, 2004)

5.3.2 Process management

As opposed to institutional design, process management deals with relatively small and incremental changes in networks. This is what some scholars describe as “hands-on” meta-governance, referring to “practical” activities of designing, monitoring and improving the processes in networks (Sørensen and Torfing, 2005; Gjaltema, Biesbroek and Termeer, 2019). Process management involves, among other things, the activation of actors and resources, goal intertwinement, joint knowledge production and guidance of network interactions (Klijn and Edelenbos, 2007).

Activating actors and resources is necessary for boosting the productivity in networks (Klijn and Edelenbos, 2007). For example, through coupling necessary actors and terminating dysfunctional interaction, network managers can create opportunities for goal intertwinement (Koppenjan and Klijn, 2004). In addition, to reduce strategic uncertainties in networks, promoting agreements between stakeholders is necessary. This could mean formulating the agreements about objectives, methods of working, information and decision-making processes. Parties should also agree on how, and by whom, will the interactions be supported within network, given the substantial importance of these aspects for enabling progress in decision-making process. Strategies aimed at managing interactions are social in nature and can be related to mediating actors, maintaining an attractive agenda, promoting substantive variety, providing conflict management, guarding knowledge production, etc. (Klijn and Edelenbos, 2007)

Incentives for cooperation can be created through clarifying goal alignment opportunities. Goal-achieving strategies, therefore, have a strong cognitive character and are mostly concerned with influencing actors' perceptions about the nature of the problem and the possible solutions (Klijn and Edelenbos, 2007). Networks are comprised of actors with different and sometimes conflicting perceptions, meaning that developing capabilities for dealing with multiple frames is necessary for enabling desirable outcomes in a networked environment (Termeer *et al.*, 2015, Jessop, 2003). Cognitive uncertainties present in complex problems such as IBOR reform often derive from the absence of joint frame of reference, which is why cross-frame learning and establishing common ground for joint action is especially important. This can be done, for instance, though avoiding early cognitive fixations, furthering goal intertwinements, creating substantive variety, advancing cognitive reflection and organizing substantive selection. (Koppenjan and Klijn, 2004)

Scientific knowledge is necessary for problem-solving, especially for dealing with substantive uncertainties. For example, the case of reference rate reform has shown that expert input is highly desirable in the presence of uncertainties and it has become evident that scientific insight has had an important role in shaping the problem-solving processes during this reform (Dudley, 2018). However, in order to eliminate knowledge disputes that are inherent to complex problem-solving, scientific knowledge should be integrated in such a way that supports the learning process between stakeholders. Organizing research activities so that they contribute to the knowledge production can benefit from treating research as a parallel stream to problem-solving, promoting facilitative research and establishing clear boundaries between research and negotiation arenas (Koppenjan and Klijn, 2004).

6 Conclusion

This research aimed to explore the means for enhancing the capabilities of network governance in the context of solving complex contemporary problems. Based on the process-oriented case study conducted on the case of IBOR transformation, it can be concluded that network management has an important role in enabling the conditions for successful network governance.

Case study as a research design has a tremendous potential for explaining complex phenomena, however, reducing the inherent risks that this approach might entail is challenging. Enabling a holistic insight into the ongoing reform was difficult not only due to insufficiency in the literature on the IBOR transition process, but because the role and functioning of the financial indices in general have been a relatively overlooked area of research for academics. As a result, the explanatory capabilities of this research are limited. Nevertheless, besides contributing to the study of contemporary social phenomenon, case study as a research strategy managed to yield interesting results for the case itself.

Presenting the wicked characteristics of IBOR transition revealed the truly complex and uncertain nature of the undertaking. Interconnectedness between substantive and strategic complexities present in the problem reflect a need for a holistic approach that would be capable of reducing the uncertainties that undermine the problem-solving process. As presented in the research, the wicked problems are social in nature, meaning that complexity stems mostly from divergence in frames, values and knowledge. Therefore, successful coordination of actors lies in addressing these differences.

The prescriptive analysis of network arrangements that formed in the aftermath of LIBOR scandal revealed a growing recognition that there is no single private or public institution that would be capable of addressing the vulnerabilities of financial indices alone. In the presence of public-private effort in this reform, the decision-making process has seen varying success. The impasses present in the problem-solving process are mostly related to cognitive and strategic uncertainties that exhibit reciprocal influence.

Enabling international coordination and collaboration among the network actors in order to advance the development of new solution has been a priority in the current stage of the reform. Enabling the collaborative arrangement in networks is strongly related to network management. In this context, the research has indeed demonstrated that the need for meta-governance relates to overcoming coordination problems and failure to reach substantive outcomes.

In order to explore possible methods and instruments of network management that, firstly, have been recognizable in the case of reference rate reform and, secondly, can contribute to enhancing the network performance in the presence of substantial, strategic and institutional uncertainties, this research presented different means of institutional design and process management. The implementation of these strategies is highly context-specific, requiring further analysis of interaction patterns and the causal mechanism behind network management, which is beyond the scope of this research. However, it can be concluded that in order to manage complex interaction processes in networks one must recognize the interrelated nature of cognitive, social and institutional factors that constitute these interactions, meaning that the efforts to address each underlying factor should not be isolated from one another.

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