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Transnational Business Governance Interactions and Technical Systems in Global Finance

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The TBGI Project

Transnational initiatives to regulate business activities interact increasingly with each other and with official regulation, generating complex governance ensembles. Heterogeneous actors and institutions interact at multiple levels and in various ways, from mimicry and cooperation to competition and conflict. The TBGI Project investigates the forms, drivers, mechanisms, dynamics, outputs and impacts of transnational business governance interactions (TBGI) from diverse theoretical and methodological perspectives. It is funded by a Social Sciences and Humanities Research Council of Canada grant led by Professor Stepan Wood, Osgoode.



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Transnational Business Governance Interactions and Technical Systems in Global Finance

Abstract: Most transnational regulatory problems involve technical systems: extended sets of productive connections between humans, organized knowledge, and material objects. The functioning and relations between transnational business governance (TBG) schemes in any particular issue area are usually shaped by these technical systems. These technical systems and the material world that they interact with are not simply exogenous environments for TBG schemes. Individual TBG schemes can enhance their power and influence by expanding their function in a technical system, by incorporating the material aspects of the system into their activities, or by producing the system's technical knowledge. I hypothesize that where a robust technical system exists, the degree of integration and the need for coordination of the activities it involves will mean that in most cases that technical system will be coordinated overall by only *one* TBG scheme. There are two exceptions: where technical systems overlap; or where the system is so weak that competitive pressures outweigh the factors contributing to specialization. The article develops these themes by drawing on theories that have focused on the social and political aspects of technical systems. The article identifies the contributions and limits of these theories and of a focus on technical systems in analyzing interactions among TBG schemes. The relevance of the theoretical points is assessed with regard to the TBG schemes that are active in global finance.

Key words: Transnational governance; private governance; international finance; technical systems

Jel Classification: F02 - International Economics International Economic Order
F23 - Multinational Firms; International Business
F55 - International Institutional Arrangements
F59 - International Relations and International Political Economy: Other
G18 - General Financial Markets Government Policy and Regulation

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Introduction

There is a pressing need to understand better the relationships among the proliferating and increasingly complex sets of transnational business governance (TBG) schemes that are evident across a variety of industries and issue areas. The editors of this issue (Eberlein et al, this issue) define TBG as “systematically involving a significant degree of non-state authority in rule-making, implementation, or enforcement across national borders.” TBG can involve a complex mix of public and private actors and institutions, with various governance functions distributed across them. Consistent with its dictionary definition, “scheme” can refer to “a systematic or organized configuration”, which does not necessarily imply strategic intention, or “a plan or program of action; *especially*; a crafty or secret one” which does (Merriam-Webster 2012). Patterns of interaction among the actors and institutions involved are significant for understanding the overall behavior and effects of a TBG scheme.

There are important public policy reasons to better understand TBG schemes. Today, most significant transnational governance initiatives incorporate private actors in some way. A great many such initiatives also involve the interaction of multiple and disparate governance mechanisms rather than a fully integrated project with clear boundaries. For example, as discussed further below, the governance of financial derivatives markets involves interactions between the rules managed by the private International Swaps and Derivatives Association, the organizational capacities of particular banks, local legal systems, and public authorities organized in various transnational groupings, including the G20 and the OTC Derivatives Regulators’ Forum. These interactions and the governance they provide constitute the TBG scheme for derivatives. There are a great many public policy problems that require this type of complex coordination, but we need to understand better the factors that shape different TBG schemes and the interactions among them.

This article focuses especially on the degree to which *technical systems* can shape TBG schemes. A technical system can be defined as a set of relationships among humans and non-human objects that are shaped and constrained by the operations that are seen as required to successfully achieve a purpose or output that is associated with that system.¹ An example is an electrical grid, where coordination of the voltage is crucial to all aspects of the system, from the hydro-electric dam to the desk lamp. Today very large technical systems are increasingly common, and many, such as train systems, the airline industry or financial trading systems, cross borders. However, smaller and less clearly defined technical systems, such as a set of best practices that are central to the functioning of an industry segment, can also play a role in structuring TBG schemes.

This emphasis on technical systems differs from approaches which start from the strategies and interactions of key actors in different TBG schemes and to try to see why these might involve competition at some times, and collaboration at others. Outcomes

¹ For foundational work in the study of large scale technical systems see Hughes (1983), Mayntz and Hughes (1988). See also Perez (1986), Callon (1991).

might be predicted by the relative capabilities of the actors. Another approach is to focus on the interaction of the predominantly private TBG schemes with more purely public actors, and to treat these as part of a co-regulatory process. In contrast, an emphasis on technical systems draws our attention to the relationship between TBG schemes and the structure of the activities that they seek to govern. From this perspective TBG schemes are governance nodes that arise from a relatively dense set of inter-related humans, objects, and practices, organized around certain shared purposes that may precede the emergence of any recognizable TBG scheme.

I hypothesize that where a robust technical system exists, the degree of integration and the need for coordination of the activities it involves will mean that in most cases that technical system will be coordinated overall by only *one* TBG scheme, but with two exceptions: where previously independent technical systems begin to overlap or where the system is so weak that competitive pressures outweigh the factors contributing to the tendency for a technical system to have only one TBG scheme. Together these conjectures help understand the impact of technical systems on TBG schemes.

This emphasis on the interaction between TBG schemes and technical systems is not intended to suggest that strategic actors not relevant. Instead, the purpose is to bring into clearer view a set of very important industry-level factors that can be missed if analysis focuses too narrowly on the interactions among TBG schemes and states. Without considering the significance of technical systems it will be difficult to be effective in the design or analysis of TBG schemes. Some of these industry-level factors are mentioned in the other articles in this special issue, especially the structure of the supply chain in the forestry cases (Cashore and Stone; Overdevest and Zeitlin, both this issue), and the difference in production processes and the character of the product in the diamond, mining, and conflict mineral cases analyzed by Haufler (this issue). However in this article I focus more directly and systematically on these industry-level factors.

The first part of this article conceptualizes technical systems and their relationships to TBG schemes. In the second part of this article I examine the case of global finance. Global finance overall is more technically complex and interdependent than many industries, including at least some aspects of the resource-based industries that are the focus of the other articles. This case is therefore particularly well suited to exploring the significance of technical systems for TBG schemes.

Technical systems and TBG schemes: conceptual issues

Intuitively it seems plausible that complex integrated technical systems such as nuclear reactors, aircraft carriers, a rail network, or an electrical grid require some degree of centralized coordination. If pilots competed with each other for when and how to land on an aircraft carrier, disaster would soon ensue. This is quite different than the type of decentralized coordination that is sufficient for pedestrians to avoid bumping into one

another on a sidewalk. In these examples, the need for centralized coordination seems clearly linked to the technical properties of the objects and systems involved. The complexity, integration and precision of controls needed to land a plane on a carrier and the risks associated with the failure of those control systems are far greater than for a pedestrian on a sidewalk.

Despite its intuitive plausibility, the relationship between governance and technical systems has often not been considered seriously enough. For much of the past half century states and firms were conceptualized as atomized competitors, governed by the constraints of that competition. While technologies such as weapons systems or industrial innovations were considered, they were mostly treated as either exogenous to the relationships that really mattered, or as sufficiently controlled by atomized actors that they did not play any significant independent role analytically.

Today there is increasingly widespread recognition that these competitive actors are embedded in and operating through a complex and dense set of formal and informal institutions that shape their interaction to an important degree. In the study of states this has been evident in a shift from simple realist models to complex conceptions of global governance (eg. Djelic and Sahlin-Andersson 2007). In the study of firms this is evident in the shift from models of perfect competition to topics such as value chains (Dicken et al 2001), national business systems (Whitley 2007), and larger sub-disciplines such as institutional economics, and law and economics. These shifts provide an opportunity to consider more carefully the independent impact of the technical systems that are also part of the environment of state and market actors and that may shape the governance arrangements that they develop.

Insights from existing literatures

The notion of a technical system has been most clearly developed in a literature that was inspired by a detailed analysis by Hughes (1983) of the emergence of generation and transmission systems for electricity (Dosi et al., 1992; Foray and Freeman, 1993; Cantwell, 1989; Mayntz and Hughes, 1988). This literature has emphasized the degree to which these technical systems needed to address a series of interrelated technical, social and political problems before they could emerge. Once a technical system is established it can have a self-reinforcing momentum that extends not only to the objects involved, but to the humans who are organized around its functioning. A technical system involves a complex mixture of ideas and materiality. Cantwell (1989) and others (eg. Dosi and Orsenigo 1988:16) have referred to “technological paradigms” which include expertise, definitions of problems to be solved, ways of solving them, and the types of technical artefacts that should be developed and used.

It is important to stress that the idea of a technical system should not imply the types of functionalism or technological determinism that have been severely and appropriately criticized for underestimating the roles played by human agency and politics. The constraints on a technical system do not arise from some deep systemic functional imperative beyond the reach of humans, but instead from a creative collective engagement

of groups of humans and objects which produces shared understandings of the goals, tasks and tools involved in addressing particular types of problems. However even if the technical system is socially constructed, for the participants in the technical system it often appears that they must work with and through the existing technical system.

Technical systems can also involve a non-functional exercise of power, for instance when a firm makes use of a privileged position in such a system to reproduce its power and exclude others, or when actors seek to reinforce their power by recruiting objects to extend it. Actor-network theory is particularly useful in analyzing the interaction of humans, objects, and power in ways that provide insights into technical systems.² A well-known example is Latour's (2009) analysis of the similarities and differences between the governance role of a police officer directing traffic and a speed bump. In technical systems, objects and non-humans can reinforce the actions and power of humans, such as with rulebooks, but also defeat them, such as with unexpected viruses.

Taken together these literatures are useful in developing the concept of a technical system and in beginning to see how this concept is relevant to TBG schemes. A technical system involves a set of interdependent relationships among actors and objects, engaged in a common enterprise that is seen as involving certain functional constraints, but that is also shaped by relations of power and conflict. Where the technical system operates, as most do today, within a networked horizontal environment where eliciting collaboration is more effective than issuing hierarchical commands, actors need to consider the opportunities and barriers that the technical system offers if they wish to be successful. For instance a music producer today that only issued products on cassette tapes would be less likely to succeed than one that had considered distributing the product electronically using digital rights management. This need to interact with existing technical systems applies to TBG schemes as well.

The relationship between technical systems and TBG schemes

Older models of command and control business regulation typically would place the regulator in the state with its supreme authority, issuing mandatory rules to govern less powerful business actors, including those connected to one another in technical systems. TBG schemes, in contrast, involve non-state authority to a significant degree, and the previous boundary between regulators and firms becomes blurry. Public authorities may implement policies through TBG schemes, but the reverse is possible as well, such as when an industry successfully gets rules formulated by a TBG scheme implemented by government.

This shift from command and control business regulation is part of a larger shift in governance towards more horizontal networked arrangements where goals are achieved by enrolling (Callon, 1986; Braithwaite and Drahos 2000) or orchestrating (Abbott and

² On ANT see for instance Law and Hetherington (2000). More generally see Biagoli (1999).

Snidal 2009a) a variety of relatively autonomous sets of organized activities. Complexity, globalization, social acceleration, information technologies, and growth in education levels have all been identified as factors contributing to this shift. TBG schemes have some autonomy from public authorities, but at the same time the activities that TBG schemes seek to govern also involve a wide variety of other relatively autonomous governance mechanisms that must be aligned with the TBG scheme's goals if the TBG is to be successful. These other governance mechanisms could include, for example, recognized best business practices or technical artefacts, such as voltage regulators in an electrical network. In other words, a TBG scheme is not primarily a stand-alone rule-making authority but instead is a node in a set of linkages among relatively autonomously governed activities that run from the micro-level activities in the industry through the TBG scheme to the public authorities that seek to regulate that industry, with relations of influence moving in both directions.

There is an important relationship between the concept of a technical system and the concept of an "industry". Industries have certain well-recognized shared ways of doing things, and they usually have a degree of interdependence, such as a common reliance on a supply of a particular production input, expertise, legal environment, reputation, or market. Although we typically think of industries as quasi-natural categories, they, like technical systems, are constructed, and their boundaries or defining properties can change. Industry associations help organize and define the industry, and address its common problems. Typically an industry that reaches a certain threshold of definition and recognition will have a single industry association for the same reasons that were offered above for a technical system having a single TBG scheme. Often a TBG scheme will rely upon an industry association to initiate, provide or support it.

Despite these overlaps and similarities it is useful to have a distinctive concept of a technical system rather than just relying on the concept of an industry. A technical system refers more directly and explicitly to the ties that constitute its integration, allowing us to more easily assess variations in this type of integration that may or may not coincide with the boundaries of an industry. The complexity and practical challenges associated with technical systems are also more likely to be accompanied by the types of private rulemaking that TBG schemes exhibit, whereas the simpler types of shared interests that are often associated with an industry may only lead to more minimal outputs of an industry association, such as pressuring governments for rule changes, or joint promotional campaigns extolling the industry's virtues. There is a rich and useful literature on industry associations and the roles that they play in governance (eg. Streeck and Schmitter 1985). These associations often act as or contribute to TBG schemes in their industries.

An industry that has the properties of a highly integrated technical system is likely to have a very different relationship to a TBG scheme that seeks to govern it than would a fragmented industry that consists of a large number of firms that have little connection with one another. Both the capacity for governance and the need for centralized coordination are likely to be greater in more tightly integrated technical systems, leading to a closer and more interdependent relationship between such a system and any TBG scheme that seeks to govern it. A TBG scheme that seeks to govern an industry that is organized to

a significant degree by a technical system will have to draw on the organizational properties of that technical system if it is to be successful.

My emphasis so far has been on the relationship between the organization of an industry by a technical system and a TBG scheme, but it is important to consider as well the role of public authorities. Public authorities have extraordinary powers that can break up and reorganize technical systems, such as when the US government broke up AT&T's monopoly of the US telephone system, or when US and European competition rules constrained Microsoft's efforts to encode Explorer's dominance in its software. However these types of government actions are likely to be rare since, in general, public authorities value the outputs of technical systems and do not wish to disrupt them.

A TBG scheme provides a useful intermediary between an industry and public authorities. In some cases the technical system may be closely integrated with the industry but relatively detached from the public authorities. In other cases the public authorities may be more directly integrated with the technical system. For the industry, a single TBG scheme can more effectively promote the technical system's interests with public authorities. Public authorities may also find it more efficient to engage with a single TBG scheme and there are many ways they can encourage this, such as providing privileged access, legal authority, or funding to a chosen TBG scheme. However if a technical system is absent or weak the TBG scheme is likely to be weak as well, either lacking significant content, or being heavily dependent on public authorities. Where a technical system is robust, it is unlikely that public authorities would impose competing TBG schemes on it. Accordingly, technical systems are important analytically even where public authorities are taking strong initiatives in the development of TBG schemes.

The above points lead to the hypothesis set out in the introduction to this article: where a highly integrated technical system exists, we may expect a single TBG scheme to provide overall governance for that technical system rather than multiple TBG schemes that compete to provide governance services. This is because the integration of the technical system requires a degree of coordinated governance, and this is usually likely to outweigh any efficiency benefits of competing governance providers. Moreover, the integration of a governance node with a technical system makes it difficult for competing governance providers to establish a foothold in the technical system. This logic can be partially captured by more rational-choice oriented concepts such as economies of scale or network effects, both of which can offer an explanation for why it might be more efficient to bring governance functions together in a single TBG scheme. However the concept of a technical system explains why economies of scale and network effects may be present in some industries and not others, and helps illuminate in more detail the specific relationships that tie a TBG scheme to the industry it seeks to govern.

It should be emphasized that this hypothesis does *not* claim that there is only one TBG scheme associated with each highly integrated technical system, but rather that only

one TBG scheme will provide *overall* governance for the system. A large technical system is likely to include many smaller subsystems and if these are tightly integrated they too may each have a single TBG scheme. However these sub-system TBG schemes are not likely to compete with the TBG scheme that provides overall governance for the larger technical system.

Not all industries have highly integrated technical systems, and thus it is important to consider exceptions to the above hypothesized relationship. Technical systems are not stand-alone machines interacting with external environments, but rather zones of interconnectedness within larger networks of interaction. The tightness of this interconnectedness can vary. Perrow (2004) has distinguished between “tightly coupled” and “loosely coupled” technical systems. The former are more time-dependent, permit less variation in the sequence of required steps, have little slack, and are prone to what Perrow has called “normal accidents”, such as a meltdown in a nuclear plant. However there are also other variations in interconnectedness that can have an impact on the competitiveness of TBG schemes. Two exceptions to the above hypothesis are especially important in explaining the presence of competing TBG schemes.

First, two technical systems that previously were relatively independent of one another can begin to overlap in their operations, leading to competition between their TBG schemes. This change could primarily be geographic, when two technical systems operating independently in different regions expand into each other’s territory. It could also be functional, such as when technical systems cross industry boundaries in new ways. The growing overlap between the electronics and automobile industries is an example. The technical systems may merge, in which case a single TBG scheme will arise, but if they retain some independence then they may each have a single TBG scheme that competes with the other. This may involve political conflict.

Second, where the technical constraints in a technical system are seen as quite weak the advantages of having competing governance providers may outweigh the advantages of having a single coordinating TBG scheme. This is likely to occur when the industry is closer to a structure that is characteristic of atomistic competitive markets than to an integrated technical system.

How can we identify the presence of a technical system in a way that ensures that this identification is independent of the number of TBG schemes involved? Without answering this question there is a risk that the hypothesis will be tautological, unfalsifiable, and meaningless—that the presence of a single influential TBG scheme will be taken as evidence of the presence of a technical system.

There are two key empirical criteria of the presence of a technical system, one more ideational, and the other more material. First, the actors involved identify themselves as part of a common enterprise, such as an industry, a production process, or a network, that has a purpose. “Enterprise” here implies that there is a common product or outcome that defines this identification. Second, the linkage of these actors to the enterprise’s goal is seen as constraining the actors. These constraints may have an easily identifiable material

character, such as joint reliance on a shared physical infrastructure, source of inputs, distribution mechanism, or some other function, or collective sequential transformation of a particular object. However the constraints may take a less self-evidently material form, such as when a recognized set of formalized practices are seen as required if the goals of the enterprise are to be attained. These practices, which may be especially important in service economies, may seem ideational rather than material, but they will always have a material aspect, such as the inscription of rules and forms on paper or electronic media, or the physicality of particular humans in particular offices. In all cases the participants in a technical system are linked by more than a set of shared ideas, and the system has a degree of autonomy so that it cannot be changed by thinking alone or by the disaggregated initiatives of individual actors.

TBG schemes and technical systems in global finance

In this section I examine TBG schemes in global finance. The emphasis is on the governance of private financial markets rather than official development assistance or monetary policy since these latter aspects of finance mainly involve the financial and monetary practices of states rather than the regulation of business. There are a great many TBG schemes in global finance. For an overview of many of these schemes and the private transnational associations linked to them see McKeen-Edwards and Porter (forthcoming). This book was based on an examination of 225 such associations. The present paper draws on that research.³ The complexity and variation across TBG schemes and associations preclude quantitative analysis, and a comprehensive qualitative survey goes well beyond the scope of the present article. However, the relevance of technical systems to TBG schemes can be illustrated by an examination of a more selected set of financial TBGs.

I start with the largest and most important categories of transnational financial activities, some of which, such as banking, securities, and insurance, are usually considered to be industries themselves. In each case private authority is most evident in the central role played by a transnational financial association. The following sections relate these expressions of private authority to TBG and technical systems in these major categories of activities. It will become apparent that these technical systems, even though they are not tightly integrated, play an important role. I then turn to other types of TBG schemes, including smaller ones displaying more variation in their degree of integration and competition.

Private authority, associations, and TBG schemes in the major categories of transnational financial activity

³ The associations were identified using the Yearbook of International Organizations and internet searches. Information on the associations discussed in this section can be found on their websites, which can be located using Google, as well as in the references noted.

As discussed above, there is a relationship between technical systems and industries because both of these involve, and are defined by, a set of distinctive interdependent practices that may overlap or coincide, and because industry associations often play a key role in TBG schemes. A striking feature of the associational landscape in global finance is the degree to which major types of financial activity have a unique transnational financial association that claims to represent the interests of the business actors involved in it. These associations are the primary vehicle through which private authority is constituted and integrated with TBG schemes for that category of activity. Key examples of associations and the category of activity they uniquely represent include the Institute of International Finance for banking, the Global Financial Market Association (GFMA) for securities, the International Swaps and Derivatives Association (ISDA) for derivatives, the World Federation of Exchanges (WFE) for organized financial exchanges, and the Alternative Investment Management Association (AIMA) for hedge funds.

The governance roles of these associations are quite varied. In all cases they involve a mix of involvement with governance mechanisms that are primarily controlled by public authorities, and governance mechanisms of their own, and this mix constitutes the TBG scheme for the activities they represent. Of the examples mentioned, the ISDA has the most developed independent governance mechanisms, but it too illustrates this mix. Its own governance mechanisms include a model contract and other standardized documentation, which play a key role in the organization of over-the-counter (OTC) derivatives markets, and ISDA “Determinations Committees” which rule on whether a borrower’s difficulties constitute a “credit event” that will trigger payments by sellers of credit default swaps to buyers who purchased the swaps to avoid exposure to such events. The ISDA has also very actively sought to influence the rulemaking of public authorities, mainly seeking to prevent new regulation by pointing to the ISDA’s own governance capacities, but also seeking to alter national legislation to ensure that local legal systems will enforce contracts based on ISDA documentation (Biggins and Scott 2011). This pattern dates back to the explosive growth in international derivatives in the 1980s, and continued through the most recent global financial crisis where a new ISDA governance structure for market practices created in 2009 was billed as supporting G20 objectives.

In contrast, the IIF plays a more modest role in providing its own governance mechanisms for banking, but aggressively engages with a much more developed set of transnational governance mechanisms controlled by public authorities, giving this TBG scheme for banking a more public character. The IIF’s own governance mechanisms include the sharing of data on sovereign risks, which date back to the organization’s founding in the midst of the sovereign debt crisis of the 1980s, and guidelines and best practices which were issued in the midst of the most recent global financial crisis (IIF 2008). However the IIF plays a much more important governance role in its interactions with the Basel Committee on Banking Supervision (BCBS), a grouping of representatives from national public bank regulatory authorities. The BCBS has developed far more elaborate transnational rules than have been provided by public authorities for the activities associated with the other examples provided above. The BCBS has very closely consulted with the IIF in the development of these rules, including incorporating an IIF proposal to let the largest banks use their own internal risk models when calculating the

levels of capital they were required to hold. The success of the BCBS standards is heavily dependent on their implementation in the operations of private banks. Critics see the IIF's involvement with public regulators as an instance of capture, since it gave the largest banks a competitive advantage and replaced public rules with private risk models (Claessens and Underhill 2010).

Like derivatives and banking, the other major types of transnational financial activities all display this varying mix of public and private governance elements in their TBG schemes. In securities markets public authorities cooperate primarily through the International Organization of Securities Commissions, which has produced a relatively weak set of transnational standards, and the WFE has sought to influence these, while also independently contributing to governance by developing principles that its own members must follow (McKeen-Edwards, 2009a). The AIMA, whose members account for about 75% of global hedge fund assets (Groome 2009), contributes to governance with its Chartered Alternative Investment Analyst designation (CAIA), its "sound practice guides", its support of the private Hedge Fund Standards Board, which was established in 2008 following expressions of concern about the industry from the G8, while also seeking to influence rulemaking by public authorities. Created in 2009, the GFMA has three members: the Association for Financial Markets in Europe (AFME), the Asia Securities Industry & Financial Markets Association (ASIFMA), and, in the United States, the Securities Industry and Financial Markets Association (SIFMA). SIFMA and the GFMA shape regulation through lobbying, but SIFMA contributes to governance as well through the provision of standard forms and documentation for securities markets transactions.

There are a great many other examples of transnational associations that similarly claim to uniquely represent other distinctive types of transnational financial activity, and that contribute to governance through a mix of their own rulemaking or other private governance mechanisms, and through their engagement with the rulemaking of public authorities. While it is not possible to extensively enumerate these in the present article, it is useful to mention two additional cases of private sector contributions to transnational governance, which combined with the ones mentioned above cover all the major categories of transnational financial activity. The first is the insurance industry, which as a whole primarily comes together at the meetings of the International Association of Insurance Supervisors (IAIS), a public sector institution to which private firms are invited. The IAIS plays a much weaker role in governance than the BCBS or IOSCO (McKeen-Edwards 2009b).

The second and more complicated case is accounting, which is important for all financial activities and therefore does not constitute as distinctive an industry as do banking and the other activities discussed so far. Accounting displays competition between the US Generally Accepted Accounting Principles (GAAP), which are significant internationally because of the number of foreign firms that use US markets, and the International Accountings Standards Board (IASB), which produces International Financial

Reporting Standards (IFRS), used in almost 120 countries around the world. The IASB is a private sector body that was given a public sector oversight body, the International Accounting Standards Committee Foundation Monitoring Board in the wake of the 2007/8 financial crisis. There is a major effort, pushed by the G20, to converge the two sets of standards as soon as possible. The International Federation of Accountants (IFAC) also plays an important role in setting professional standards, in sponsoring the International Auditing and Assurance Standards Board (IAASB) which sets auditing standards and three other boards for accounting ethics, education, and for public sector accounting (Loft and Humphrey 2009).

In short, the major categories of activities in global finance are represented by associations that provide rules of their own and work closely with public rulemaking processes, and these public-private arrangements constitute TBG schemes. In global finance there is no overarching private authority that is more important than the ones discussed. It is possible to point to more diffuse forms of private authority, such as a generalized belief in the value of financial markets, but when it comes to concrete governance arrangements, all the most significant forms of TBG are organized around particular types of financial activity, facilitated by recognized financial associations. There are overlaps and collaborations across some of these types of activities, but none that are robust enough to have resulted in lasting TBG schemes.

The role of private authority in the above cases varies greatly. The ISDA's independent contribution to governance is sufficiently important that it by itself could almost be characterized as a fully private TBG. However even here the public elements are important, and thus it is best to consider the combined elements of the ISDA and public authorities, which include the latter's willingness to not implement regulation, as constituting the TBG scheme for derivatives. At the other extreme, the IAIS is a public authority, and the role of firms is mostly limited to participation in the meetings it organizes. However, as previously stated, TBG schemes are governance nodes that arise from a relatively dense set of inter-related humans, objects, and practices, organized around certain shared purposes, and in this conception the IAIS is an important node in the transnational governance of insurance, and its connections to private firms are sufficiently important in it playing this role that it may be characterized as part of the TBG scheme for insurance. While it is not possible to explore in detail here, the ordering capacities of insurance firms, including reinsurers, also contribute to this scheme (Haufler 1997; McKeen-Edwards 2009b).

How do technical systems interact with TBG schemes?

What then does the concept of a technical system add to our understanding of these TBG schemes? A first point relates to the categories of activities discussed above. All of these except accounting have a node of governance in which private actors are integrated through a single unique association. In each case the activities have the characteristics of a technical system, although the degree of integration and materiality of these systems varies. Earlier in this paper the two indicators of the presence of a technical system were (a) that the actors involved identify themselves as part of a common enterprise, such as an

industry, a production process, or a network, that has a purpose; and (b) the linkage of these actors to the enterprise's goal is seen as constraining the actors. Each of the above categories is defined functionally, by the common purposes of the activity, rather than by some other characteristic, such as nationality, territorial proximity, a shared brand, or the personal connections of the firms' owners. A single firm may be active across categories: its participation in the TBG schemes associated with those categories is determined not by the identity of the firm as a whole, but rather by whether the functional activities that the firm carries out match with the categories.

Each category comes with distinctive constraints that are closely related to the content of the TBG scheme that governs it. Banking at its core involves maturity transformation, such as funding of loans or other assets through the acceptance of shorter term lower cost funding, such as deposits. The BCBS rules primarily seek to regulate this by exposing bank shareholders to the risks of these activities (by requiring certain levels of capital relative to risk-weighted assets), thereby protecting other actors such as depositors or taxpayers. Derivatives involves a more active trading of risks that are detached from the asset that they reference, and ISDA rules primarily focus on the contracts that facilitate this. Financial exchanges, such as the New York Stock Exchange, primarily provide architectures that facilitate the trading of stocks and related products, and which require centralization of order flow, and mechanisms to inspire trust. The WFE and IOSCO therefore focus on rules that foster trust, such as information disclosure and deterrence of fraud, and that prevent the financial actors involved in this centralization from abusing their position. Much securities market activity involves more direct trading among firms and this larger and less regulated category of activity is the focus of the GFMA and SIFMA. Insurance involves the pooling of risks, and the IAIS focuses on the distinctive problems associated with this, such as the accumulation of risks from insurance firms by reinsurers located in lightly regulated jurisdictions.

What is the source of the coherence that these categories display? Why do activities consistently fall into these categories despite the enormous creativity and pace of change in global finance? In part the answer can be found at the level of shared ideas, where the existence of recognized practices such as banking or derivatives trading and the characteristics associated with them facilitate transactions that otherwise would be too amorphous or confusing to carry out at any significant scale. However there are material dimensions to this interdependence as well. The standardized contracts provided by the ISDA are not just carried around in traders' memories: they are inscribed on paper or in electronic systems, and thereby made more durable. Each of the categories of financial activities discussed above comes with such material artefacts, including the electronic linkages between banks, the physical or electronic architectures of exchanges, archives of data on the pricing and volume of securities trading, or binders of policies and procedures. To participate in the activities associated with one or another activity a financial actor must make use of and conform to these ideas and material artefacts. Taken together these shared ideas and material artefacts are like tools designed to carry out particular tasks that don't

work well for other tasks. These constraints, and the functional purposes to which they are related, are the defining properties of a technical system.

Explaining variation in the mix of public and private elements across TBG schemes

Can an emphasis on technical systems help explain the variation across TBG schemes that the cases discussed above reveal? The above discussion showed how the major categories of transnational financial activity have the properties of a loosely integrated technical system, with one public/private TBG scheme that seeks to govern each category as a whole. But why are public sector rules more prominent in banking and private sector rules in derivatives markets? Why are financial exchanges organized into an association that interacts with the public regulators while insurance firms are not? The distinctive properties of different technical systems help answer these questions. The maturity transformation function at the core of banking creates an inherent risk of collapse since banks may not be able to liquidate their longer term assets if depositors or other short term sources of funding start to lose confidence in the bank. Since the risks associated with this maturity transformation are managed internally by the bank, it is hard for banks to inspire confidence if doubts arise. Moreover banks play a key role in the payments system, exchanging payments with one another and customers, and thereby increasing the risk of contagion as problems at one bank spread to others and threaten the economy as a whole. Accordingly it is not surprising that public authorities typically have been strongly concerned with bank regulation and support of banks during crises, including at the transnational level.

In contrast, the trading of securities and derivatives more often involves risks that are restricted to those who own or trade them, and rules managed by financial actors themselves have traditionally been seen as more appropriate than in the banking case. Such rules are needed because of the highly integrated character of market exchanges, which involve the bringing together of multiple competing buyers and sellers, often from outside the industry itself. Insurance involves even less systemic risk and interdependence, and therefore less need for formal rulemaking: premiums are typically paid in for a long period of time before a claim for a loss arises, and unlike bank deposits those premiums cannot be suddenly withdrawn if doubts arise about a firm's solvency. The insurance firms themselves share risks through reinsurers, but the management of these risks can more easily rely on rules provided by reinsurers in private contracts than is the case for financial exchanges, where the relevant parties to transactions are more variable and external to the industry.

Explaining variation in the degree of competition among TBGs

In the first part of this article I hypothesized that the need for coordination of technical systems would result in a single TBG scheme arising for each technical system, with two exceptions: where previously separated technical systems begin to overlap or where the technical system is weak enough that the advantages of competition outweigh the advantages of having a single TBG scheme. In order to assess this hypothesis it is helpful to expand the number of cases beyond the ones discussed so far, to introduce more

variation than is present in the large well established categories of activity such as banking, securities, derivatives or insurance that were discussed above. It is useful to start with accounting because of its importance in global finance and because of the competition between the US GAAP and the IASB which was noted above. However it is also useful to consider other examples of competition. I focus on TBGs with two very different types of technical systems. The first are centralized securities depositories (CSDs) which involve more tightly integrated technical systems dependent on shared material infrastructures, and the second are professional designations in risk management, for which the technical system is very weak. Both display competition, but in the former case there are strong tendencies to integrate competing TBG schemes, as is the case with accounting. These cases help explore the hypothesized relations between a technical system and competition between TBG schemes that were discussed above.

In the case of accounting, the split between US GAAP and the IASB's standards and the effort to harmonize them represent a shift from a US-based technical system to one that is more compatible with multiple other jurisdictions. Accounting is a relatively integrated technical system since its purpose is to allow investors to make rigorous standardized comparisons of the financial health of the firms in which they are investing. If standards are not sufficiently harmonized or specific this comparison cannot happen. US accounting has been oriented towards highly competitive capital markets from the start, while accounting elsewhere was more oriented towards taxation or less market oriented forms of financing. As the European Union became more integrated and powerful it was able to sponsor competing standards to US GAAP (Posner 2009). However the push to harmonize US GAAP and the IASB standards indicates that the advantages of having a single global TBG scheme in accounting standards outweighs the political advantages to the US or the EU of having their own distinct schemes.

A similar example of overlapping technical systems is provided by central securities depositories. CSDs have been very important in financial markets because they allow widespread securities trading to occur while the actual securities remain in a single location, avoiding continual costly and risky physical transfer. Once a trade is agreed, it is settled by recording the change of ownership at the CSD. CSDs contribute to governance in carrying out this organizational function, in safeguarding securities, and in establishing certain rules for CSD clients. In the US there are two CSDs, Fedwire Securities Service run by the public Federal Reserve banks, which handles securities issued by public authorities, and DTC which handles all other securities. DTC grew out of a fragmented US CSD landscape and now enjoys an effective monopoly (European Commission 2012: 68). In Europe there are two international CSDs: Euroclear and Clearstream. Euroclear has a closer connection with Belgian, French and Dutch markets, while Clearstream has a closer connection with German ones. Clearstream has a dominant market position, and has been convicted of abusing this dominance. As well there are dozens of national CSDs in Europe.

As cross-border trading has grown there have been multiple efforts to integrate

CSDs, complicated by political concerns, such as European worries about US dominance or national worries about threats to local CSDs. The European Central Securities Depositories Association (ECSDA), created in 1997, has developed standards and made other efforts to remove obstacles to cross-border settlement. Euroclear and Clearstream have established an “electronic bridge” to facilitate trading across both CSDs. The International Securities Market Advisory Group was established in 2007 to bring together various stakeholders with the goal of increasing standardization and efficiency in the operations of Euroclear and Clearstream (2011). With European Commission encouragement, key European securities market actors agreed to a voluntary code of conduct for market infrastructures in 2006, designed to promote interoperability. Euroclear and Clearstream have each developed close linkages with different sets of national CSDs, using mergers, joint ventures, or other mechanisms (European Commission 2012: 52). The ECB is presently sponsoring a “TARGET2-Securities” (T2S) initiative with a 2015 deadline, which will be a technical platform to facilitate coordination among CSDs. Facilitating the reduction of barriers among CSDs has become a priority for the European Union. Overall the experience of CSDs in Europe illustrates how highly integrated technical systems that were once separated from one another geographically can start to overlap as cross-border interactions become more common, and then to begin to integrate with one another. This process can bring about the integration of previously distinct TBG schemes.

In general professional designations involve much more weakly integrated technical systems. Individuals with the designation are interdependent with regard to their reputations and technical knowledge, but do not have to interact directly with one another through a single physical architecture, nor are third parties as dependent on harmonized professional designations as they are with accounting standards. Thus it is not surprising that there is more competition among TBG schemes for designations than is the case for CSDs. For instance both the Global Association of Risk Professionals and the Professional Risk Managers’ International Association provide codes of conduct and professional designations, and there are two other organizations, the International Federation of Risk and Insurance Management Associations and the Risk Management Association which provide some overlapping information sharing functions, although without providing designations.

Alternative approaches

It is useful to contrast this emphasis on technical systems to alternative ways of analyzing TBG schemes. Most existing analysis of governance in global finance focuses on the role of public authorities (Helleiner and Pagliari 2011). There are important differences between approaches that emphasize the interests of domestic regulators (Singer 2007), the power of the US state (Panitch and Konings 2008; Simmons 2001), the power and competitive interactions of many states (Drezner 2007, Helleiner 1994), or the ongoing interactions of regulators in transnational policy networks (Porter 2011; Slaughter 2004; Tsingou 2009). With the exception of the last of these, which acknowledges the influence of private actors in transnational networks, the tendency is to treat private financial activities as an external object of governance. Even those who emphasize transnational policy

networks have not fully considered the interactions between ongoing industry activities and governance in the way that a focus on technical systems makes possible.

An excessive emphasis on the power of public authorities cannot adequately explain the TBG schemes that have been discussed above. There is no question that the advantages to public authorities and to an industry of interacting through a single governance node contributes to the patterns discussed above. However this is strongly shaped by the properties of the technical system involved. If state actors were the dominant factor explaining the organizational configuration of TBG schemes in finance one would expect this to be more centralized, and not to correspond to functional categories, but rather to concerns more relevant to states, such as their alliance patterns, their national sovereignty, or particular political problems. During the most recent financial crisis states coordinated their interactions through multifunction institutions such as the G20, the Financial Stability Board, and the International Monetary Fund, but the types of interactions with industry that TBG schemes represent were instead organized by technical function, as they had been prior to the crisis.

Literatures that overemphasize the power of private actors also cannot adequately analyze the above TBG schemes. The link of these schemes to distinctive types of activities and the lack of TBG schemes for finance as a whole do not fit with approaches that see financial governance as explained by the interests of a unified financial class or elite (Gill and Law 1989). Other literatures that focus on the sociology or internal organization of the financial industries (Knorr-Cetina and Preda 2005) are valuable but they have not generally linked their analysis to transnational public governance. Treating TBG schemes like competing firms in a single market, each trying to expand its market share for governance services, does not fit the above cases, which exhibit very little competition between TBG schemes.

To some degree the technical properties of industries and their relationship to TBG schemes can be analyzed with more narrowly economic concepts such as network externalities or coordination games (Abbott and Snidal 2001), but if they are left at this level of abstraction it is difficult to discern and measure their presence except by tautologically using the type of TBG they are associated with as an indicator. In contrast, the notion of a technical system allows detailed analysis of the specific ideational and material ways that humans and objects are linked in a particular set of activities.

Conclusion

This article has argued that it is important to consider the role played by technical systems when analyzing the complex variety and interactions of TBG schemes that are becoming increasingly prominent in global governance. It defined a technical system as involving a set of relationships among humans and non-human objects that are shaped and constrained by the operations that are seen as required to successfully achieve a purpose

or output that is associated with that system, and pointed to the frequent overlap or correspondence between a technical system and an industry. It specified two indicators of the presence of a technical system: that the actors involved identify themselves as part of a common enterprise, such as an industry, a production process, or a network, that has a purpose; and that the linkage of these actors to the enterprise's goal is seen as constraining the actors. It noted that the degree of integration of technical systems can vary, with some continually linking actors closely together in a shared physical infrastructure, with others involving a more minimal set of shared practices.

The article argued that in most cases the properties of a technical system lead to the emergence of a single TBG scheme addressing issues relevant to the system as a whole. The major categories of transnational financial activity, with the exception of accounting, follow this pattern. In each case the private authority elements of TBG schemes were facilitated by associations. These associations provided governance functions themselves while also seeking to influence governance functions provided by public authorities. While the advantages of having a single point of interaction between public authorities and an industry certainly contributed to this pattern, the correlation of each of these single nodes with a technical system of which it is part indicated the importance of that technical system in explaining the pattern. Moreover variations in the properties of the technical system help explain variations in the character of the TBGs that are associated with them, as with the difference between the prominence of the private sector ISDA in the case of derivatives, and the public sector IAIS in insurance.

The article also hypothesized that competition among TBG schemes would occur where technical systems begin to overlap or where the technical system is so weak that the advantages of competition outweigh the advantages of centralized coordination. Examples were provided of the competition between technical systems and TBGs that is created when technical systems that were previously separated by geography begin to overlap, including the competition between US GAAP and the IASB standards, and competition among the European CSDs. However each of these also displayed efforts to integrate the competing technical systems and TBGs—shifting towards the re-emergence of a single TBG scheme presiding over the newly integrated technical system. Elements of challenges to dominant actors in these processes were evident in the unwillingness of the EU or other foreign actors to rely on US TBG schemes in the case of accounting and the CSDs. The competition among TBG schemes where technical systems are weak was evident in the case of professional risk management designations.

These patterns that are revealed by bringing technical systems into analysis of TBG schemes would be obscured by alternative approaches that focus on the competitive interactions of TBG schemes, or that see TBG schemes as shaped by public authorities. Both of these alternatives neglect the ways in which the private and public elements of TBG schemes arise from and interact with the organized technical properties of the industry activities that they seek to govern.

The richly detailed empirical information that can be integrated with theoretical analysis when TBG schemes are considered in relationship to technical systems is very

helpful for enhancing our understanding of TBG schemes, but also makes the establishment of comprehensive and conclusive theoretical claims more challenging. There is much more that could be said about the technical systems that were analyzed above, and the great many that were not. The article compared the most important categories of financial activity and also provided examples of more specific sets of activities with technical systems that varied in their degree of integration. While these confirmed the hypotheses, it would be important to extend the analysis to other cases, and to explore the complex interactions between organized technical subsystems, such as CSDs, and larger technical systems in which they operate, like the securities industry. As well, there is interesting work to be done to compare the relationships between technical systems and TBG schemes in finance with other issue areas.

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