Financial Risk as a Common Pool: Competition, Capture, and Governance of a Networked System

W. Travis Selmier II
The Vincent and Elinor Ostrom Workshop in Political Theory and Policy Analysis
Indiana University
wselmier@indiana.edu

W. Kindred Winecoff
Assistant Professor,
Department of Political Science
Indiana University
wkwineco@indiana.edu

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Abstract

Germain (2012) argued that international political economy (IPE) scholars should pay especial attention to dynamics in global finance related to rising powers, the durability of liberalization, and the interplay between public and private actors in governance. The purpose of this presentation is to formally launch such a research program linking Ostrom School concepts to the governance of international financial markets and systems. Governance of finance is complex, problematical, and regulated by a mishmash of public and private agencies operating at multiple levels (Ciepley, 2013; Helleiner, 2011). The Ostrom School emphasizes the possibility for effective polycentric governance of complex systems (Ostrom, 2010), but the conditions under which that could occur in global finance have not yet been explored. Questions surrounding the capacity and even legitimacy of financial regulatory and governance bodies lead us toward a pragmatic institutional approach wherein "fair distribution of the benefits and costs of alternative financial system[s]" (Mügge, 2011: 67) are used to engineer comprehensive governance mechanisms. This research program is already underway: agenda-setting papers introducing core concepts involving club goods and networks in finance (Cerny 2014; Selmier 2013, 2014, Winecoff, 2013) have integrated the work of Workshop scholars (Schlager & Ostrom, 1992; Polski, 2003; McGinnis, various), and a panel at this summer's WOW-5 broadened, deepened and expanded these concepts. A proposed special issue of an IPE journal would continue these efforts.

A NEW, BUT NOT SO NEW, RESEARCH PROGRAM

> *No manner of councils and committees in which each of the constituents retains its particular value orientation and operating assumptions can develop an integrated resource program.*[1]

This paper formally launches a research program linking international financial market dynamics and governance policy to the Ostrom School.[2] Ostrom School foundations of this research program have been laid over 60 years (V. Ostrom, 1953; E. & V. Ostrom, 1977; E. Ostrom, 2010; McGinnis & Ostrom, 2014), past Workshoppers offered powerful, linking works on finance and banking (Polski, 2003), and a team which we represent have each recently published agenda-setting works linking core Ostrom School concepts to finance.[3] We believe that conceptualizing global finance as a networked ecology[4] allows us to employ concepts and themes from the Ostrom School in a rewarding way.

Capital is an essential resource in any economy, modern or ancient. Yet governance of finance is complex, problematical, and regulated by a mishmash of public and private agencies operating at multiple levels (Ciepley, 2013; Helleiner, 2011). The Ostrom School emphasizes the possibility for effective polycentric governance of complex systems (McGinnis, 2010: 5-8; Ostrom, 2010), but the conditions under which that could occur in global finance have not yet been explored. Governance of financial markets and financial

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[1] V. Ostrom (1953: 493).

[2] In our view, the Ostrom School informs financial market governance. We employ McGinnis' definition (2010: 5) of governance as "the process by which the repertoire of rules, norms, and strategies that guide behavior within a given realm of policy interactions are formed, applied, interpreted, and reformed," noting his description of multiple governance sources to achieve more ideal forms of polycentricity (2010: 6-7).

[3] Representative papers include: Bakır, 2013; Cerny, 2014; Oatley, Winecoff, Danzman & Pennock, 2013; Schwartz, 2009; Selmier, 2013; 2014; Selmier, Penikas & Vasilyeva, 2014; Trzcinka & Ukhov, 2010; Winecoff, 2013; Young, 2013;2014. In addition, a panel at last summer's WoW5 conference introduced this research program, and a proposal for special issue of the *Review of International Political Economy* has been submitted.

[4] We purposefully describe global finance as a "networked ecology" because we have not yet classified components into a socio-ecological framework (McGinnis, 2010; 21-24; McGinnis and Ostrom, 2014). Our hope is that Ostrom School and IPE scholars will work together to construct an SES framework of global finance, but challenges include "… how broadly the SES framework can be usefully applied remains an open question" (McGinnis and Ostrom, 2014: 29).

products are complex in part because their property rights often resemble club goods rather than private goods (Cerny 2014; Selmier 2014). Financial market actors, especially financial intermediaries and very large investors, have been able to capture returns of these products while exteriorizing, or socializing, a portion of the risk. This financial risk may be shifted within a financial institution from risk-takers to risk-averse actors (Penikas, 2012) or shifted onto other market participants, and even spread onto society as a whole (Cerny, 2014; Selmier, Penikas & Vasilyeva, 2014). This paper explores the property rights of financial products drawing from works in common pools and environmental, financial and international political economics. In so doing we pull from Ostrom School works (Dietz, Ostrom & Stern. 2003; McGinnis, 2007; Schlager & Ostrom, 1992 to list but a few).

International political economists (IPE) have extensively studied the governance and regulation of global financial markets, but have not yet integrated key insights from the Ostrom School. Instead, most IPE scholars approach the subject from the perspective of public choice – especially the focus on regulatory capture as formulated by Peltzman (1976) and Stigler, (1971);[5] welfare economics;[6] or various Marxian traditions.[7] These studies have made many advances, but in a recent survey of the literature Germain (2012) argued that IPE scholars should pay especial attention to dynamics in global finance related to rising powers, the durability of liberalization, and the interplay between public and private actors in governance. Modern IPE scholars often probe how a pragmatic institutional approach wherein "fair distribution of the benefits and costs of alternative financial system[s]" (Mügge, 2011: 67) may be used to engineer comprehensive

[5] E.g., Grossman and Helpman (2001); Oatley and Nabors (1998).
[6] E.g., Kapstein (1989), Singer (2004, 2007).
[7] Frank (1998); Wallerstein (1993).

governance mechanisms. We believe that linking concepts and themes from the Ostrom School to existing IPE scholarship offers opportunities to enrich both literatures and move us toward the ideal that Mügge describes.

We first present an argument as to why financial risk may be viewed as a common pool, which provides a natural bridge connecting key concepts from the Ostrom School to the study of finance. We then examine why and how this common pool nature of financial risk affects competition between actors, the methods and motivations of those actors toward regulatory capture, and the structure and governance of networked system in finance. Lastly, we further discuss and integrate Ostrom Workshop principles into extant themes of IPE concerning international finance. Throughout the paper we adopt an ecological view of finance and use the core theme of risk to develop our ideas.

VIEWING FINANCIAL RISK AS A COMMON POOL

> *The 19th century Scottish merchant bankers were willing to "face almost any risk for the sake of the difference between 4 per cent at home and 4 ½ per cent across the Atlantic."*[8]

Risk and uncertainty are integral to financial contracting and to business itself. The specific uses of these terms *risk* and *uncertainty* began to acquire technical meanings centuries ago, meanings which Frank Knight (1923: III.VIII.2) codified when he famously argued that:

> *The practical difference between the two categories, risk and uncertainty, is that in the former the distribution of the outcome in a group of instances is known (either through calculation a priori or from statistics of past experience), while in the case of uncertainty this is not true, the reason being in general that it is impossible to form a group of instances, because the situation dealt with is in a high degree unique.*

[8] W.T. Jackson, quoted in Chapman (1984: 98).

Whether Knight's statement adequately differentiates between risk and uncertainty has long been debated. “Risk requires both exposure and uncertainty,” as Holton (2004: 22) notes. That is, an actor who takes on risk must be aware of her acceptance of risk but, by definition, uncertain as to what the outcome of that acceptance may be. A certain outcome entails no risk acceptance, as the outcome is assured. Only under conditions of uncertainty is risk an important influence on behavior, but uncertainty is not calculable probabilistically whereas risk may be.

Knight’s statement also introduces the idea that learning the expected probability of an outcome through “past experience” or through “calculation” may pull an action out of an actor’s pool of uncertainty and into a risk pool. So asymmetric information advantage, gained either through experience or access or both, should lower *uncertainty* for the one possessing the advantage. Modern finance is predicated on these ideas- that risk exposure can be probabilistically calculated to improve expected return or to mitigate loss (Bhidé, 2009; van Horne, 1985; Nelson & Katzenstein, 2014). But this becomes complicated in the tightly-networked ecology which finance has become. Financial risk can be inadvertently imported from one’s partners, about whom obtaining perfect information is impossible. Are financial actors always aware of the risk they have accepted by engaging in financial markets?[9] As financial markets and capital-raising knit all economic actors together, are economic actors- all people- aware that they may be affected through financial risk? The

[9] An apt description of tail risk is “[Humans] have acted to dampen or remove risks that occur frequently. Such interventions are based on a reduced image of the dynamics involved, in which the short time scales predominate. In the process, a range of new (unknown) dynamics at different time scales may be introduced, including (very) long ones that are hard to detect in the short run. The net effect is that more and more frequent threats are brought under control, while new, infrequent dangers are created.” This from Young, Berkhout, Gallopin, Janssen, Ostrom and van der Leeuw’s description of human responses to environmental risks in socio-ecological systems (2006: 306).

last half-century or so have taught us that "Banking crises are the train wrecks of finance" (Barth, Caprio & Levine, 2005: 26), and the networked nature of financial risk transmits financial crises through the entire economy.

To understand how financial risk is dispersed through an economy we must first understand what financial risk is. Selmier, Penikas and Vasilyeva (2014) argue that risk may be conceived of as a complementary good of uncertain type. It is complementary because risk is consumed only in conjunction with another good. We may hear someone say, "Josephine likes risk." Josephine does not acquire risk directly, however, but obtains it through acquiring some other good such as a technology stock, or by engaging in rock-climbing or another activity that the observer considers to be risk-bearing. The risk is complementary in that it comes packaged with the primary good. Financial risk comes packaged through an investment acquisition.

But what type of good is financial risk? Here there is uncertainty since financial risk arises through the size of Josephine's investment position as conditioned by her position within the global financial network structure. If Josephine is an average individual investor, the risk position that accompanies the acquisition of a technology stock is a *private* good. She alone bears the risk. If Josephine is the senior partner in a hedge fund and takes a large position in that technology stock, then the financial risk acquired affects all who work in her hedge fund. The financial risk in this scenario conforms to a *club* good financial structure, in that all who work at Josephine's fund share in gains and losses through their compensation and employment (Selmier, 2013; 2014a). Within the "walls" of that club which is the hedge fund, the financial risk embedded within the technology stock position is a club good. Moreover, if other firms observe Josephine's behavior and emulate it then

the additional risk encumbered creates a new, expanded club as others are exposed to the financial risk contained in the technology stock.

If Josephine is a massive investor, and her hedge fund's investments are of such size that a market-wide effect occurs or may occur if the value of her assets expands or contracts, then embedded financial risk is better seen as a common pool. So the expansion of financial risk transforms type over time as actors move into and out of markets.[10] Selmier, Penikas and Vasilyeva (2014) analyze the Hunt Brothers' attempt to corner the silver market between 1974- 80 in terms of the risk packaged with their extensive acquisitions of physical silver and silver futures. Initially, the Brothers acquired an estimate $20 million in physical silver, then switched to silver futures to increase their leverage.[11] Other market actors initially succeeded in deflating the increasing silver price, but the Brothers continued to acquire silver through the futures markets (Abolafia & Kilduff, 1988: 184-5). Rather than "unwind" their futures position by selling futures contracts at a profit the Brothers demanded physical delivery,[12] arranged for warehousing space to store the silver, and continued to buy futures contracts by pledging assets in the family oil company.

Silver prices spiked in 1980 as physical delivery could not be made due to shortages- the Brothers had literally cornered the global silver market. The embedded risk position had, over 6 years, grown from a private good to a club good (industrial users of silver, such as

[10] Selmier (2014a: 332) characterizes this shift in property rights as transmutation of a financial product.
[11] Physical silver refers to silver in metal form, such as coin or bars, or the contracted volume of the physical metal agreed to be delivered from a mine or refinery. Silver futures refers to a financial contract in which the buyer has the right to demand delivery of the physical good at, or over, a specified period in the future at a specified price. The buyer obtains only an option to pay for the silver, but does not yet own the "underlying" silver on which the financial futures contract is written. The seller of the contract need not have position of the physical silver underlying the contract.
[12] The majority of futures contracts on all commodities are "unwound" rather than satisfied through physical delivery. The original buyer of the contract simply sells her contract at a profit, if the price of the commodity increased; the original seller of the contract may purchase an equivalent contract through a clearinghouse or the specific contract originally sold.

film companies, were affected) to a common pool as the risk affected all market participants to, finally, a public good. Or rather, a public "bad" as the economic disruption caused by spikes in other commodities was severe. The Brothers were finally stopped when their banks called in loans used to acquire all that silver (Economist, 1980a; 1980b).[13] After a 9-year legal battle, the Brothers paid a large fine, lost a significant portion of their family oil company and were barred for life from trading in the American commodity markets (Eichenwald, 1989).

As this anecdote illustrates, the type of good financial risk embodies depends upon its embeddedness in the financial sector and real economy. Historically, club structures which pool risk have been very common. Financial actors have employed two mechanisms to estimate risk and to spread it out through financial products that share risk among a larger number of actors: the first is creation of larger structures that distribute risk across a membership whose members are compensated through possible profit-sharing. The property rights structure of these products and market structures can resemble club goods as described by Cerny (2014) and Selmier (2014a).[14] The second mechanism consisted of governance structures whose purpose was to manage risk and contagion within the members of that structure. Table 1 provides a typology for financial products and structures a sense of the complexity of financial products and institutional arrangements in finance,

[13] The banks were not only concerned about the economic implications of Brothers' massive attempt to corner the silver market, but also the regulatory sanctions and legal cases mounting up against the Brothers' actions. One can also suppose that the network effects of the silver price spike on their other customers played a part.

[14] Both point out that the benefits derived from "membership" in the financial club may not be evenly distributed. Cerny argues this leads to a kind of club good pathology (2014: 356-61); Selmier suggests this tiering of benefits has been the nature of financial club goods since inception (2013; 2014a). Indeed, financial club good structures have been around to share risk and return for centuries (Dowd, 1994; Goodhart, 1987).

Insert Table 1 about here

An example of complex institutional arrangements can be seen in the clearinghouses created by banks in the 19th century to process drafts drawn on banks. An ongoing debate in financial history revolves around whether banks needed a central bank or could simply self-govern clearing and even rescue operations through collective arrangements such as clearinghouses. Dowd (1994: 294) argues that a clearinghouse is structured as a bank club, but actually also provided a public good in the form of confidence in the banking system:

> *This greater public confidence is not a free good that can be conjured out of thin air, but a rational response to the perceived safety represented by clearinghouse membership, and it depends to a considerable extent on the ability of the clearinghouse to protect the integrity of the banks by controlling the risks they take.*

The challenges facing clearinghouses revolved around regulatory issues, capital adequacy within the *local* system, and the requirement for strict enforcement. Participating banks had to be within reasonable daily travelling distances in 19th century travel terms. While clearinghouses could and did suspend weak banks in times of banking panic, there were cases where such panics necessitated significant outside help (Moen & Tallman, 1999) or even led to chaotic dissolution of the clearinghouse. Commercial bank clearinghouses did not survive long into the 20th century, and their decline is a subject of additional debate. Goodhart (1987) argues that the financial system outgrew clearinghouses, which were simply not robust enough to deal with banking information asymmetries.

His argument (see also Gorton & Mullineaux, 1987) may be viewed from the perspective of this paper as the growing risk due to growing financialization in industrializing economies. Clearinghouses, fundamentally incapable of handling growing financial risk, gave way to powerful, government-run central banking institutions such as the Federal Reserve Bank in

1913. The last "club-like" central banking was Bank of England, which was converted into a government unit in 1944 (Tilly, 1989: 197; Selmier, 2013: 18).

In both of these mechanisms the connectedness of financial actors increased through their shared risk. Then as now, the distribution of financial risk throughout a market led to a structure of interdependence. The organizational structure of financial markets thus impacts the appropriateness of particular governance mechanisms. Banking clubs had then been used as governance mechanisms in simpler, localized financial markets. Of course, partnerships themselves were risk-sharing, profit-concentrating club-like structures as noted below.

As financialization brought banking to a more central, more politically-powerful position, some banks grew to sizes much greater than others in the local clearing houses. These larger banks sometimes left the clearing houses. The reasons for this are also under debate, but it is only a small stretch to assume that larger banks' extensive reputational capital and their concern with weaker banks impelled their exit. These larger financial institutions' concentrations of capital and political power increased their importance to governments.

So financial risk outran the earlier club structures as the financialization of industrial economies proceeded (Selmier, 2013). Banks and bankers, not wanting to hold financial risk within partnerships or clearinghouses, externalized or socialized as much as possible through creative risk management and risk socialization techniques. And governments, recognizing the "train wrecks" of banking crises and the increasing financialization, realized that ad hoc club-like structures like clearinghouses were too local, too vulnerable, and too weak in enforcement power to work in their industrializing economies. This

implies that in order to understand the role of finance in modern societies we must consider two variables: the *density* and *distribution* of connections in the financial system. These two variables condition the incentives that financial actors face and the impact of their choices on the rest of the system. As we elaborate below, financial risk-sharing structures can take on multiple forms – from highly centralized to highly decentralized – and positions within this structure reflect one's exposure to risk.

THE NETWORKED ECOLOGY OF FINANCE

> *In the pit, they work to perform a certain kind of alchemy—turning risk into profit.*[15]

Futures pit traders represent one of the last bastions of individual financial actors taking significant amounts of risk which are publicly known to us. Of course there are day traders trading on their own account, but these individuals are largely hidden from the public eye. The stories we have heard of the great financiers such as Siegmund Warburg, J.P. Morgan or Tong King-sing, who took on significant personal financial risk, seem a bit outdated and somewhat romantic. Modern finance and banking consists of highly-networked ecologies. In fact, banking and financial contracting have long been economic activities in which financial risk and reward were shared across networks and through club structures that sometimes expanded into common pools of financial risk.

This sharing occurs partially through the intermediary nature of banks and financial institutions and their positions in financial networks. Banks intermediate across both *space* and *time*. In *space*, a so-called "vanilla" bank accepts deposits from those who have capital and makes loans to those who require capital; in *time* this archetypal bank converts short-term deposits into long-term loans, engaging in "qualitative asset transformation"

[15] Zaloom (2004: 365) describing financial futures' traders in the Chicago Board of Trade (CBOT) pits.

(Boot, Greenbaum & Thakor, 1993; Greenbaum & Thakor, 1995). This simple model allows banks to profit through exploiting the interest rate spread that represents the bank's risk inherent in maturity mismatch. Leverage enables the bank to further increase profit as additional loan amounts may be made on the quantity of funds deposited. In their intermediation role, banks and bankers have long relied not only on financial capital, but also on reputational and informational capital. Understanding the historical development of banking helps us to see the network ecology of modern global finance and to better grasp risks inherent in the network structure.

While banking has been around for millennia, the present dominant strain of commercial and investment banking is tied to the rise of Atlantic Trade in the early 19th century.[16] As this trade developed, some merchants taking on financial obligations outside their own trading house through credit extension. These merchants became merchant bankers as they migrated toward a pure financing business while leaving the physical movement of cotton, iron and wool to others (Dorfman, 1951; Hidy, 1941; Morrison & Wilhelm, 2008). Reputation and trust were essential in a world where "Anglo-American merchant-bankers achieved monetary gain by lending the prestige of their name without lending any money whatsoever in most cases" Hidy (1941: 58). Boot, Greenbaum & Thakor (1993) viewed these archetypal banking partnerships consisting of two forms of capital: (1) the partners' financial capital in the firm and (2) human capital which was "liquefied through accessing the partners' networks of contacts" (Selmier, 2013). But human capital is more accurately viewed as consisting of two parts: reputation gained from clients, fellow bankers, the

[16] Other forms of banking include (but are not limited to) shariah-compliant finance, cooperative banking structures, kerb, shadow and "back-alley" banking, and other modern forms of non-bank financial institutions.

general public and governments, and informational capital. Informational capital consisted of partners' tacit knowledge on clients and other bankers in the 19th century; as the 20th progressed it came to mean extensive financial market information garnered through transactions and through processing power (Boot, 2000; Morrison & Wilhelm, 2004; Selmier, 2013).

A merchant bank was a club good structure where boundaries were delineated by immediate family, or more distant family ties with strong co-religionist or cultural links (Chapman, 1984; Cassis, 1985; Morrison & Wilhelm, 2008). Financial risk began to move outside these merchant banks almost with their establishment. For instance, the practice through which merchants and merchant banks structured syndicates to create partial ship ownership became standard business by the 1830s (Chapman, 1984; Hidy, 1941; Killick, 1974). This practice mirrored earlier Venetian and Ottoman trading and financing arrangements (Frank, 1998: 68-72; Fratianni & Spinelli, 2006; Tilly, 1992). Syndication was also required in the enormous bond issues required to finance both sides during the Napoleonic Wars (Buchinsky and Polak, 1993; Kennedy, 1987: 76–84; Rasler & Thompson, 2000). Large war bond issuance stimulated a "two-way system of raising and simultaneously spending vast sums of money [which] acted like a bellows, fanning the development of western capitalism and of the nation-state itself" (Kennedy, 1987: 77).

As industrial development required more capital, latter 19th century banking operations spread risks through long-lasting and one-off partnerships, setting the foundations for more sophisticated, pan-industry syndication efforts. These efforts pooled the expertise of investment bankers (the direct descendants of merchant banks) with capital-endowed

insurance companies. Financial engineering grew.[17] The foremost London "financial engineer" of his time, H.O. O'Hagan, explained in 1888 the simplicity of his unique security issuance syndication:

> Why should insurance not be extended to the guaranteeing of the subscription of issues of shares and debentures. . . ? I began by approaching some of the larger trust and investment companies . . . persuad[ing] them to risk having to take three or four times the amount they were contemplating if the capital were not fully subscribed, I paying them a commission for so doing.[18]

Financial innovations created new ways to distribute risk across a range of actors who became increasingly interconnected with each other through creditor-debtor relationships. As these networks developed and deepened, traditional partnerships proved inadequate. Partnerships carried insufficient capital as needs for RR financing grew in the 2nd half of the 19th century. In response to capital requirements and increasing risks, some banking firms grew very rapidly between the late 19th century and onset of the Great Depression. National City Bank of New York (predecessor to Citibank) grew from a president and two clerks in the 1890s to 500 employees by the beginning of World War I, then rapidly expanded outside the United States so that by 1917 there were some 1600 domestic employees and 600 employees stationed overseas (van Cleveland & Huertas, 1985: 32, 89-91). As global interlinkages in the financial network grew and American banks responded, this put pressure on banks in other parts of the world:

[17] Financial engineering, for our purposes, is defined as creation of financial products and financial market structures that share reward and risk through combining novel forms of mathematical finance and organizational structure. While modern observers have come to admire or decry the tools of mathematical finance used in financial engineering, the critical nature of property right delineation in new financial products and structures is not yet fully appreciated by many observers.
[18] Quoted in Chapman, 1984: 88.

> *The foundation of Barclays Bank in 1896 [occurred] at the very moment when the private deposit bank was receiving its last blow... formed by the simultaneous amalgamation of twenty private banks, the partners in which were all linked by strong family ties.*[19]

The international ambitions of American banks in the early 20th century, and their increased local and global interconnectedness, played a major role in the U.S. government's decision to centralize monetary governance. This culminated in the founding of the U.S. Federal Reserve Bank in 1913 (Broz, 1997; Eichengreen, 1996: 40-6; Moen & Tallman, 1999). The shift from local to networked finance reordered the importance of the three forms of capital in banking firms (Morrison & Wilhelm, 2008; Selmier, 2013). Vast amounts of money were invested in information systems as the importance of reputational capital declined, particularly after the Great Depression. At the same time, the experience of the Depression motivated policymakers to limit the local activities of finance through domestic regulations, while constraining global capital movement through the Bretton Woods system.

With the collapse of the Bretton Woods agreement in 1973, the activities of banks operating within a network structure became increasingly important (Alessandri & Haldane, 2009; Rothschild, 1976). Because risk had been distributed throughout the network, systemic instability could be generated by the actions of one or several units. Indirect connections to these units could jeopardize firms that had no direct risk exposure at all, and the overall density of the system was large enough that no small club could govern it. As risk became dispersed throughout the global financial system

[19] Cassis (1985: 218)

macroprudential supervision became increasingly important to central banks and legislatures (Kapstein 1989, Oatley & Nabors 1998, Singer 2007).

At the same time, understanding the corporate finance of firms and banks in this interlinked network grew in importance. Banks' financial structures were analyzed to determine possible risks. As a bank may be seen as a specialized type of corporation, banks' capital strategies might be assumed to follow what became the paradigmatic model of corporate finance- the Modigliani and Miller model. This model argued that the value of a firm is unaffected by whether the firm is financed through equity or through debt (Modigliani & Miller, 1958).[20] So capital structure was to a large extent irrelevant, and firms could be generically analyzed through representative agent models in financial economics, given certain assumptions -- efficient markets, zero transaction costs or taxes, symmetrical information.

Whether asset accumulation is funded by increasing equity or liabilities is thus trivial. However, under common conditions of taxation such as the deduction of interest payments, equity financing becomes relatively more expensive and debt financing becomes more attractive (Modigliani & Miller 1963). Therefore, in real-world political economies firms have an incentive to leverage their equity capital, thus multiplying gains (or losses) from their asset portfolios. In the typical account, this incentive is only diminished by the willingness of lenders/investors to continue extending debt finance (so-called "market discipline"), or by regulatory requirements that force firms to finance their operations with a minimum level of equity capital to mitigate against the risk of

[20] In terms of basic accounting a firm's assets less its liabilities equals its equity.

insolvency.[21] In this framework, even with symmetrical information and no transaction costs, absent taxation firms are risk-neutral but in the face of taxation firms are risk-acceptant.

In other words, given simple assumptions, there is an expectation that firms will "race to the bottom" by progressively increasing leverage in order to finance risk-taking activities. Funding via equity capital is costly: it represents foregone earning potential.

Applying this logic to banks, the more competitive a banking market is the greater the temptation for banks to lend more and/or lend more riskily. In this way, banking markets resemble a prisoner's dilemma. If banks could make credible commitments to not undercut their competitors, they could all lend a reasonable amount at a reasonable interest rate, guaranteeing a reasonable profit at low risk in perpetuity. But banks cannot make such a commitment, since each bank benefits from capturing more market share. The result is that competitive pressures drive risk accumulation that may eventually culminate in a crash. A third-party intervener, usually assumed to be a government, is needed to change the structure of the strategic interaction by making a commitment to prudent behavior credible. This is done through regulation, by setting a floor under which risk-taking activities cannot fall.

Such a story expects banks in aggregate to behave as in figure 1, which represents the portion of banks' asset accumulation which is funded by equity (i.e. "tier 1") capital: competition should force homogeneity -- variance in bank capital-to-assets ratios should

[21] Firms with high leverage may be pushed into insolvency by even relatively small downturns in asset performance, since a small equity base must cover a large set of liabilities. The case for regulation on welfare grounds is that financial instability has negative societal effects, so government should limit the extent to which firms may accept risk while managing others' money.

be low -- and the central tendency should be to match the regulatory minima, plus a small buffer to protect against idiosyncratic risk. To behave in any other way would be uncompetitive, and uncompetitive banks will not last long in a dynamic market such as finance (Eccles & Crane, 1988: ch. 6; Hayes, 1979; Morrison & Wilhelm, 2004; Palmer, 2012). To keep their domestic banking sectors competitive in increasingly integrated global financial markets, governments will tend not to regulate more strictly than the international regulatory standards (such as the international Basel capital accords). So, from the standard models we should expect convergence in bank behaviors, with a high degree of clustering around minimum regulatory requirements.

Figure 1 about here

We do not exaggerate the implications of the standard models with the simulation portrayed in figure 1. Even the complication allowing a small capital buffer is recent to the financial economics literature: "Virtually all models of bank decision making... tended to assume that capital requirements are binding constraints on bank behavior" (Ngo 2006: 99). Absent those constraints banks would increase leverage, which implies increased risk. The capital buffer, represented by the distance between the regulatory standard (red vertical line) and the majority of the density in figure 1, was modeled as nothing more than insurance against an accidental erosion of capital which would lead to closure of the bank by regulators.

The political economy literature puts it even more bluntly, as noted in a post-crisis survey: "[C]ompetition has caused a race to the bottom in trade barriers, capital account regulations, tax rates, and government intervention in the economy in general"

(Meseguer and Gilardi 2009). This echoes the public interest rationale behind the origination of global capital regulations: "In an interdependent financial community in which every state wants to enhance or maintain the competitiveness of its banking sector, deregulation by one state must be countered by that of others. This competitive spiral forces regulation toward its lowest common denominator" (Kapstein 1989: 324).

Even bank regulators were complaining of bank behavior from a race-to-the-bottom point of view. Writing shortly after the recent banking crisis onset, then Executive Director of Financial Stability of Bank of England Andy Haldane and one of his economists, Piergiorgio Alessandri, complained of extensive regulatory evasion by banks creating significant systemic risk thorough extensive leveraging:

> *… There is one key difference between the situation today and that in the Middle Ages. Then, the biggest risk to the banks was from the sovereign. Today, perhaps the biggest risk to the sovereign comes from the banks. Causality has reversed.*[22]

There's just one problem: banks do not behave in this way.[23] As figure 2 demonstrates, the real-world central tendency of bank behavior is to be well above the regulatory minimum -- the median is more than triple the international standard -- and the variance is quite large. Moreover, there does not appear to be a race to the bottom *or* a climb to the top. Instead, banks *differentiate* themselves. This has major implications for the ways in which political economists understand the relationship between banks and governments. Governments responded to the subprime crisis by tightening regulatory structures at the domestic and

[22] Alessandri & Haldane (2009). Haldane is presently Bank of England's Chief Economist and the Executive Director of Monetary Analysis and Statistics.
[23] Neither do governments, according to Walter (2012).

international levels.[24] The ostensible purpose of these regulatory reforms is to counteract race to the bottom dynamics in financial markets: absent regulation, banks utilize progressively riskier lending strategies in order to capture greater market share.[25] Absent regulation, eventually, this "mania" will culminate in instability and crisis.[26] Embedded in this account are two substantive claims: one regarding the behavior of private actors operating within a competitive market system, and the other, regarding the effect of regulatory policy in conditioning those behaviors. We have seen above that the former claim is highly questionable; this suggests that the latter may be as well.

Figure 2 about here

If we are to construct a realistic theory of bank behavior which considers the broad political, economic, and financial environments with which they operate, we might be begin by calling into question the usefulness of representative agent models such as those proposed by Modigliani and Miller (1958; 1963). Indeed, researchers in the burgeoning social science of finance program have done so, noting that the Modigliani &

[24] At the domestic level many countries have made drastic revisions to their regulatory codes. In the United States, for example, the Dodd-Frank Wall Street Reform and Consumer Protection Act is "arguably the most significant financial legislation in modern history" according to Kathleen Casey, then a Commissioner of the Securities and Exchange Commission (http://www.sec.gov/news/speech/2011/spch012311klc.htm, last accessed August 16, 2012). At the international level, the Basel Committee on Banking Supervision, housed at the Bank for International Settlements, agreed on a new global standard -- its third in three decades -- regulating banking activities.

[25] Although some revisionist accounts, such as Friedman and Kraus (2011), argue that the activity of banks in the lead-up to the crisis does not comport with a view of risk maximization, noting that banks overwhelmingly invested in highly-rated securities which were insured by credit default swaps. These assets were privileged by regulatory structures such as the Basel accords. In this view, the crisis resulted from risk *concentration* rather than risk *taking*, and this concentration is at least partly as response to the alteration of incentives caused by earlier regulatory reforms.

[26] This view was of course present at least as early as Marx (1867) and has been reiterated by many since, including Polanyi (1944) and Minsky (1986). But this view is also dominant in orthodox political economy, notably Kindleberger and Aliber (2005) and Reinhart and Rogoff (2009). The government's role in intervening during panics was first articulated by Bagehot (1873). A modern examination of the politics of bank bailouts is provided by Rosas (2009). For a historical description of central bank activities during crises, and a journalistic comparison of central banks' responses to the crisis which began in 2007, see Irwin (2013).

Miller model was not "performative", in that it did not influence behavior after being proposed, nearly as much as later models such as the capital asset pricing mode (Mackenzie 2006).[27] We need not go far afield to find an alternative: contemporaneous to Modigliani & Miller, Culberton proposed a model in which investors have a "preferred habitat" in the market, which was extended in the following years (Culbertson 1957; Modigliani & Sutch 1967; Modigliani & Shiller 1973). This model suggests that heterogeneous agents have heterogeneous preferences over investments, and demand a risk premium to invest outside of their preferred market niche. Banks, in other words, wish to occupy different positions within the market ecology, make different sorts of investments, take on different types (and amounts) of risk. These preferences are reflected in heterogeneous discount rates. The aggregate result of banks operating within their own habitats need not deviate from market efficiency under certain conditions, in particular if bond prices across time follow a random walk (Mishkin 1980).

Both the original preferred habitat model and recent formal applications of it have focused on the ways in which the term structure of bond maturities presents opportunities for arbitrage, but there is no *a priori* reason why the framework is not generalizable.[28] In fact, such complications are desperately needed. In his 2011 Presidential Address to the American Finance Association, John Cochrane (2011) specifically referenced preferred habitat theory as a way to complicate representative agent approaches in productive ways, concluding with the following:

[27] Note that performativity theories would also suggest convergence in behavior rather than diversity.
[28] Also see Guibaud et al (2013).

> *Discount rates vary a lot more than we thought. Most of the puzzles and anomalies that we face amount to discount-rate variation we do not understand. Our theoretical controversies are about how discount rates are formed. We need to recognize and incorporate discount-rate variation in applied procedures.*

But how could we characterize the "habitat" that conditions the preferences of financial actors regarding their location with market structures? What theoretical or empirical tools can we employ to gain understanding of such a complex system? We believe that one opportunity comes from the burgeoning field of network science. We believe this for two reasons. First, network analysis is well-suited for studying set of relations, such as those that emerge from creditor-debtor linkages in finance; second, network analysis has developed qualitative and quantitative methods for studying complex structures *as* structures, for locating communities and subcommunities *within* those structures, and for locating individual actors within those structures and substructures.[29] In other words, network analysis is useful for understanding why financial actors may have preferences over their locations within a broader market habitat.

Banks can gain market influence according to their position within the market network. Banks at the core of the network may represent a club that is capable of socializing the risks they take while privatizing the returns. In traditional jargon such banks are "too big to fail," but a network analysis would emphasize the interconnectedness of core banks rather than their size. Indeed, the size of banks is likely a consequence of their prominence, as financial networks develop over time (Winecoff 2013).

[29] Describing socio-economic systems, note in terms very familiar to financial market actors, Young et al (2006: 309) note "The increase in connectedness is one side of the growing integration and functional complexity of SESs [financial markets] ... In a "wired world", disturbances rapidly spread across markets and societies, ramifying the effects of change … sources of changes in SESs may arise far away from their impacts…" [Financial markets] inserted by present authors.

Some influential banks may not dominate financial networks from the center, but instead act as brokers that provide bridges to financial communities that would otherwise be disconnected from each other. These banks can distribute information, expertise, and financial capital from one part of the network to others. In some settings these bridges can exert significant influence by exploiting other nodes' weak connections; under some conditions bridges can exert even more influence than the banks at the core of the system (Granovetter 1973).[30] Locating these actors is thus crucially important for understanding where within the structure influence exists.

Network scientists have extensively studied the conditions under which networks are stable or unstable, and how "contagion" can spread from one unit to others based on their ties to each other. This work has clear relevance for the study of financial governance. Policymakers have taken notice as well, as the rhetorical shift from a focus on "too big to fail" (TBTF) financial institutions to "systemically important financial institutions" (SIFI) attests.

These classifications form their own banking clubs. TBTF was a coveted club to join, and aspiring banks paid significant acquisition premiums (Brewer & Jagtiani, 2007) and saw their cost of funds drop once membership had been achieved (Hughes & Mester, 1993). Responses from global financial governance bodies shows their emerging understanding of network risk from SIFI "club members" through systemic impact rather than merely their respective size:

[30] Selmier, Penikas & Vasilyeva (2014: 120) argue that access to financial risk may be "restricted through law, custom, or size of the market actor" using logic and discussions in Schlager & Ostrom (1992). Selmier et al note that access to financial risk may be tiered in forms analogous to Schlager & Ostrom's (1992) discussion of property rights structure in common pool resources.

> *The work of the Basel Committee forms part of a forms part of a broader effort by the FSB to reduce the moral hazard of GSIFIs… [including the effort] to reduce the impact of a G-SIB's failure… and will also help level the playing field by reducing too-big-to-fail (TBTF) competitive advantages in funding markets.*[31]

Even in a highly networked global ecology we see in banking today, banks and bankers still attempt to mitigate risk and increase return through club formations. To assume banks would tend to aggregate in a tightly-clustered capital structure of debt and equity is to misunderstand their fundamental needs to differentiate themselves for competitive purposes while clustering into clubs to mitigate risk and increase profit. In a sense, the preferred habitat approach shows banks have chosen their respective financial strategies to differentiate themselves from banks that eschew their preferred capital structure. In other words, in the present global banking ecology, banks and financial institutions still seek out informal club memberships, one of which is determined by capital structure. Their preferred habitat, in capital structure terms, is with banks of a similar feather (especially if it enhances their position and reputation).

[31] Basel Committee on Banking Supervision (2011: 2)

INTEGRATING THE OSTROM SCHOOL AND A NETWORKED ECOLOGY VIEW OF FINANCE

> *… to what extent can study of ecosystems inform the design of financial networks in, for instance, their robustness against perturbation? Ecosystems are robust by virtue of their continued existence. They have survived eons of change…*[32]

An ecological approach to financial networks is not only apt; it is fundamental to financial markets and banking. Our fundamental principles of economics are based on organic principles of birth, growth, maturity, decay, death, seasonality, ripeness, and stasis or equilibrium. Environmental concepts, including biological processes, cycles and beings, are engineered into the present design of financial markets (Ciepley, 2013; van Horne 1985; Myers 2000). Not only is capital described through water analogies such as the liquidity of a stock, the viscosity of capital flows, the draining of liquidity but flow measures are used to monitor and govern financial markets. Environmental governance has been evoked for financial markets as when Joseph Stiglitz invoked the polluter pays principle when testifying that "Wall Street has polluted our economy with toxic mortgages. It should pay for the cleanup" (Stiglitz; 2008).

Following this ecological approach, we suggest there are at least five areas in which the Ostrom School can inform finance: 1, analysis of the fundamental nature of financial goods (including discussion and analysis of the bio-physical nature of those goods) in order to; 2, analyze property rights aspects of financial products. 3, explicit analysis of financial environments could be conducted by employing socio-ecological system analysis, then applying ecological/habitat governance in; 4, polycentric applications. 5, Institutional Analysis and Development (IAD) framework design may be profitably applied.

[32] May, Levin & Sugihara (2008: 893).

McGinnis notes (2007) that "A major concern of policy analysis… is to match the organizational forms by which goods or services are produced and distributed to the physical and legal characteristics of the relevant goods and services." His idea is that the property rights nature of good and services conditions transaction modalities and requires understanding of the good or service in order to choose the optimal modality. Eminent financial economist Paul Woolley (2010, p. 127) echoes this point by writing, "Policy makers can only regulate the banking and finance sectors effectively if they have a reasonable idea of how markets work."

But sometimes the transaction modality called for is not a market, or at least a simple market. Intangible goods were never easy to type, and typing them has grown more complex through constructing and accounting for complex intellectual property rights (Schwartz, 2010 and Maxfield, 2013, respectively). Also, creative financial engineering may "transmutate" a financial product into a new package of property rights.[33]

Financial products have typically been seen as private goods and so are traded on markets and governed on this basis. But this has not always been so, as Polski notes (2003: 42):

> *The earliest American banks were chartered because they were considered as 'some sort of public utility,' or in the more mystical terminology of the 18th and 19th centuries, 'public blessing'.*

This concept of stewardship in banking was fairly common before the Great Depression brought about a significant change in sentiment, and pre-Depression bankers in many

[33] The immutable bio-physical nature of a good is not incompatible with this theory of financial products. Selmier (2014a: 330-337) notes that financial products are made up of one or more financial goods which may be altered or added to, thereby altering the property rights of the product.

countries were often viewed as the epitome of prudence and financial responsibility.[34] The importance of reputational capital meant that if a banker failed he (inevitably) was ruined (Cassis, 1985; Hidy, 1941; Killick, 1976). Ostrom School scholars are well-placed to engage in further analysis linking financial goods' bio-physical nature and the property rights aspects of financial products as well as revive the discussion of stewardship in financial markets.

Ostrom School analyses of environments would be very powerful in conceptualizing and mapping financial network as ecologies. We have noted above the heterogeneity of financial actors in an ever-changing ecology. Financial market dynamics and actor heterogeneity impel us toward natural environmental analogies which could teach us about virtual environments of finance (Selmier, 2014b). Stiglitz' point about pollution is only a step along the path toward fuller environmental analyses of financial markets. Consider the parallels between a financial market crisis such as one we are still experiencing and Young et al's (2006: 306) description of an SES disturbance:

> *Thus, the temporal scale of a perturbation- as well as the scale of the system's own dynamics- is an important measure of the system's adaptive capacity, robustness, resilience, and vulnerability.*

One is not surprised that they write immediately following:

> *In this respect, SESs do not differ from purely biophysical or purely social systems.*

A polycentric governance approach which employs actors' information sets to achieve better outcomes makes sense in the complex, interlinked networks of finance (Winecoff,

[34] A Saturday Evening Post editorial of December, 1928, opined, "Our bankers are the stewards of our whole intricate credit system…[T]heir sense of obligation and their feelings of responsibility for the maintenance of that system in a high state of adequacy and efficiency are as lofty as the motives of other professional men."

2014a, 2014b; Young, 2013). The dichotomous markets-versus-government paradigm so often heard serves to increase the complexity of financial market governance. Representative of forward-looking financial economists, Houben (2013) has called for a system which would combine well-structure macro-level oversight with incentives which create better "microprudential" governance by financial actors themselves.

However

> *There is an important distinction between the relatively natural dynamics found in ecological systems and the constructed dynamic process of complex technical systems…*[35] McGinnis and Ostrom, 2014: 30

Young et al (2006) remind us that humans are reflexive and so learn to interact. A fifth valuable Ostrom School application would be to apply Institutional Analysis and Development (IAD) frameworks to analyze the nature of financial networks and transactions. While these applications are in the future, we would do well to remember the McGinnis' (2010: 5) definitional advice concerning the term "Opportunism with guile":

> *signifies a warning that some individuals may seek to extract maximum advantage from any institutional setting and so those institutions should be designed to be able to cope with the manipulative efforts of especially selfish individuals, without undermining the dynamism that the legitimate self-interest imparts to processes of institutional change. "*

This is possibly the best advice we have read as to how to cope with opportunism, good and bad, in financial markets.

[35] McGinnis and Ostrom were referring to telecommunication systems and power grids.

Bibliography

Abolafia, M. F., and M. Kilduff. 1988. "Enacting Market Crisis: The Social Construction of a Speculative Bubble." *Administrative Science Quarterly* 33(2): 177–93.

Alessandri, P., and A. G. Haldane. 2009. "Banking on the State." Bank of England working paper.

Bagehot, W. 1873. *Lombard Street: A Description of the Money Market*. London, UK: Henry S. King and Co.

Bakır, C 2013. *Bank Behaviour and Resilience: Effect of Structures, Institutions and Agents*. Palgrave Macmillan, Basingstoke, UK.

Barth, J.R., G. Caprio, and R. Levine. 2005. Rethinking Bank Regulation: Till Angels Govern. Cambridge: Cambridge University Press.

Basel Committee on Banking Supervision. 2011. "Global systemically important banks: assessment methodology and the additional loss absorbency requirement." Bank for International Settlements. Available at http://www.bis.org/publ/bcbs207.pdf.

Bhidé, A. 2009. "An Accident Waiting to Happen," *Critical Review* 21 (2–3): 211- 247.

Boot, A.W.A. 2000. Relationship Banking: What Do We Know? *Journal of Financial Intermediation* 9:7–25.

Boot, A.W.A., Greenbaum, S.I., & Thakor, A.V. 1993. Reputation and Discretion in Financial Contracting. *American Economic Review* 83: 1165–83.

Brady, S.A., K.E. Adadu, and N.R. Cooper. 2012. "The Stability of Prime Money Market Mutual Funds: Sponsor Support from 2007 to 2011." Federal Reserve Bank of Boston Risk and Policy Analysis Unit Working Paper RPA 12-3.

Brewer, E., III, and J. Jagtiani. 2007. "How Much Would Banks Be Willing to Pay to Become 'Too-Big-to-Fail' and to Capture Other Benefits?" Federal Reserve Bank of Kansas City, RWP 07–05.

Broz, J. L. 1997. *The International Origins of the Federal Reserve System*. Ithaca, NY: Cornell University Press.

Cassis, Y. 1985. "Bankers in English Society in the Late Nineteenth Century." *The Economic History Review*, new series 38(2): 210–29.

Cerny, P. 2014. "Rethinking Financial Regulation: Risk, Club Goods, and Regulatory Fatigue." In *Research Handbook on International Monetary Relations*, T. Oatley and W.K.Winecoff, editors. Cheltenham, UK; Edward Elgar Publishing: 343-363.

Ciepley, D. 2013. "Beyond Public and Private: Toward a Political Theory of the Corporation." *American Political Science Review*, 107 (1): 139-158.

Cochrane, J.H. 2011. "Presidential Address: Discount Rates." *Journal of Finance* 66(4): 1047-1108.

Culbertson, J. 1957. "The Term Structure of Interest Rates." *Quarterly Journal of Economics* 71: 485-517.

Dietz, T., E. Ostrom, and P. C. Stern. 2003. "The Struggle to Govern the Commons." *Science* 302(5652): 1907–12.

Dorfman, J. 1951. A Note on the Interpenetration of Anglo-American Finance, 1837–1841. *Journal of Economic History* 11(2): 140–47.

Dowd, K. 1994. "Competitive Banking, Bankers' Clubs, and Bank Regulation." *Journal of Money, Credit and Banking* 26(2): 289-308.

Eccles, R. G., and D. B. Crane. 1988. *Doing Deals: Investment Banks at Work.* Cambridge: Harvard Business Press.

Economist. 1980a. "Over-Exposed." January 26, 1980, pp. 70–71. Accessed March 8, 2013, on The Economist Historical Archive.

Economist. 1980b. "Kismet, Nelson." May 10, 1980, p. 70. Accessed March 8, 2013, on The Economist Historical Archive.

Eichengreen, B. 1996. *Globalizing Capital*. Princeton University Press.

Eichenwald, K. 1989. "2 Hunts Fined and Banned from Trades." *New York Times*, December 21, 1989.

Frank, A.G. 1998 . *ReORIENT: Global Economy in the Asian Age*. Berkeley: University of California Press.

Fratianni, M and F. Spinelli. 2006. "Did Genoa and Venice Kick a Financial Revolution in the Quattrocento?" Oesterreichische Nationalbank Working Paper 112.

Friedman, J. and W. Kraus. 2011. *Engineering the Financial Crisis: Systemic Risk and the Failure of Regulation.* Philadelphia, PA: University of Pennsylvania Press.

Germain, R. (2012). 'Governing global finance and banking', *Review of International Political Economy* 19(4): 530-535.

Goodhart, C.A.E. 1987. "Why Do Banks Need a Central Bank?" *Oxford Economic Papers* 39

Granovetter, M.S. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78(6): 1300-1380.

Greenbaum, S. I., and Thakor, A. V. 1995. *Contemporary Financial Intermediation*. New York: Dryden Press.

Gorton, G. and D.J. Mullineaux. 1987. "The Joint Production of Confidence: Endogenous Regulation and Nineteenth-Century Commercial Bank Clearinghouses." *Journal of Money. Credit, and Banking* 19(4): 457-68.

Grossman, G. and Helpman, E. 2001. *Special Interest Politics.* Cambridge: MIT Press.

Guibad, S., Y. Nosbusch, and D. Vayanos. 2013. "Bond Market Clienteles, the Yield Curve, and the Optimal Maturity Structure of Government Debt." *Review of Financial Studies* forthcoming.

Hayes, S. L., III. 1979. "The Transformation of Investment Banking." *Harvard Business Review* 57(1): 153–70.

Helleiner, E. (2011) 'Understanding the 2007–2008 Global Financial Crisis: Lessons for Scholars of International Political Economy', *Annual Review of Political Science* 14: 67-87.

Holton, G.A. 2004. "Defining Risk." *Financial Analysts Journal* 60(6): 19-25.

van Horne, J.C. 1985. "Of Financial Innovations and Excesses." *Journal of Finance* 40(3): 620-631.

Houben, A. 2013. "Aligning Macro- and Microprudential Supervision." In Kellermann, A.J. et al. 2013. *Financial Supervision in the 21st Century.* Springer-Verlag Berlin Heidelberg: 201-20.

Hughes, J. P., and L. J. Mester. 1993. "A Quality and Risk-Adjusted Cost Function for Banks: Evidence on the 'Too-Big-To-Fail' Doctrine." *Journal of Productivity Analysis* 4:293–315.

Irwin, D. 2013. *The Alchemists: Three Central Bankers and a World on Fire*. New York, NY: Penguin Press HC.

Kapstein, E.B. 1989. "Resolving the Regulator's Dilemma: International Coordination of Banking Regulations." *International Organization* 43(2): 323-347.

Killick, J.R. 1974. Bolton Ogden & Co.: A Case Study in Anglo-American Trade, 1790–1850. *Business History Review* 48(4): 501–19.

Kindleberger, C.P. and R. Aliber. 2005. *Manias, Panics, and Crashes: A History of Financial Crises*. 5th ed. Hoboken, NJ: John Wiley and Sons.

Knight, F. H. 1921. *Risk, Uncertainty, and Profit*. Boston, MA: Hart, Schaffner & Marx; Houghton Mifflin. Available online from Library of Economics and Liberty, http://www.econlib.org/library/Knight/knRUP10.html (accessed July 19, 2012).

Mackenzie, D. 2006. *An Engine, Not a Camera: How Financial Models Shape Markets*. Cambridge, MA: MIT Press.

Marx, K. 1867. *Capital: A Critique of Political Economy*. 1967 ed. New York, NY: International Publishers.

Maxfield, S. 2013. "Accounting Paradigm Changes and Their Impact on Corporate Social and Environmental Responsibility." Working Paper W13–12. The Vincent and Elinor Ostrom Workshop in Political Theory and Policy Analysis. http://www.indiana.edu/~workshop/publications/materials/W13-15_Maxfield.pdf.

May, R.M., S.A. Levin and G. Sugihara. 2008. "Complex systems: Ecology for bankers." *Nature* 451: 893-895.

McGinnis, M. D. 2007. "Missing Institutions and Polycentric Governance." Working Paper. http://mypage.iu.edu/~mcginnis/vita.htm#Res.

McGinnis, M. D. 2010. "An Introduction to IAD and the Language of the Ostrom Workshop: A Simple Guide to a Complex Framework for the Analysis of Institutions and their Development," Version 1b. Institutional Analysis and Development Symposium, University of Colorado Denver, April 9-10, 2010.

McGinnis, M. D., and E. Ostrom. 2014. "Social-ecological system framework: initial changes and continuing challenges." *Ecology and Society* **19**(2): 30. http://dx.doi.org/10.5751/ES-06387-190230

McNutt, P. 1999. "Public Goods and Club Goods." *Encyclopedia of Law and Economics* (online). http://encyclo.findlaw.com/0750book.pdf (accessed July 4, 2012).

Meseguer, C. and F. Gilardi. 2009. "What is new in the study of policy diffusion?" *Review of International Political Economy* 16(3): 527-543.

Minsky, H.P. 1986. *Stabilizing and Unstable Economy*. New Haven, CT: Yale University Press.

Mishkin, F. S. 1980. "Is the Preferred-Habitat Model of the Term Structure Inconsistent with Financial Market Efficiency?" *Journal of Political Economy* 88(2): 406-411.

Modigliani, F. and M. H. Miller. 1958. "The Cost of Capital, Corporation Finance and the Theory of Investment." *American Economic Review* 48(3): 267-297.

Modigliani, F. and M. H. Miller. 1963. "Corporate income taxes and the cost of capital: a correction." *American Economic Review* 53(3): 433-443.

Modigliani, F. and R.J. Shiller. 1973. "Inflation, Rational Expectations, and the Term Structure of Interest Rates." *Economica* 40(1): 12-43.

Modigliani, F. and R. Sutch. 1967. "Debt Management and the Term Structure of Interest Rates: An Empirical Analysis of Recent Experience." *Journal of Political Economy* 75(4): 569-589.

Moen, J.R. and E.W. Tallman. 1999 "Why Didn't the United States Establish a Central Bank until after the Panic of 1907?" Federal Reserve Bank of Atlanta Working Paper 99-16.

Morrison, A. D., and W. J. Wilhelm. 2004. "Partnership Firms, Reputation, and Human Capital." *American Economic Review* 94(5): 1682–92.

Morrison, A. D. and Wilhelm, W. J. 2008. "The Demise of Investment- Banking Partnerships: Theory and Evidence." *Journal of Finance* 63(1): 311–50.

Mosley, L. and Singer, D.A. 2009. "The global financial crisis." *International Interactions* 35(4): 420–29.

Mügge, D. 2011. "Limits of legitimacy and the primacy of politics in financial governance." *Review of International Political Economy* 18(1): 52-74.

Myers, S.C. 2000. "Outside Equity." *Journal of Finance* 55(3): 1005-1037.

Nelson, S.C. and Katzenstein, P.J. 2014. "Uncertainty, Risk, and the Financial Crisis of 2008." *International Organization* 68, 2 (2014): 361-392.

Ngo, P.T.H. 2006. "A Theory of Precautionary Regulatory Capital in Banking." *International Review of Finance* 6(3-4): 99-128.

Oatley, T. 2015. A *Political Economy of American Hegemony: Military Booms, Buildups, and Busts*. Cambridge University Press, New York, NY.

Oatley, T. and Nabors, R. 1998. "Redistributive Cooperation: Market Failure, Wealth Transfers, and the Basle Accord." *International Organization* 52(1): 35-54.

Oatley, T., Winecoff, W.K., Danzman, S.B. , and Pennock, A. 2013. "The Political Economy of Global Finance: A Network Model." *Perspectives on Politics* 11: 133-153.

Ostrom, E. 2010. "Beyond Markets and States: Polycentric Governance of Complex Economic Systems." *American Economic Review* 100(3): 641–72.

Ostrom, E., and V. Ostrom. 1977. "Public Goods and Public Choices." In *Alternatives for Delivering Public Services: Toward Improved Performance*, edited by E. S. Savas: 7–49. Boulder, CO: Westview Press.

Ostrom, V. 1953. "State Administration of Natural Resources in the West." *American Political Science Review* 47(2): 478-493.

Palmer, A. 2012. "The Ferment of Finance." *The Economist*, February 25, 2012.

Peltzman, S. 1976. "Towards a More General Theory of Regulation." *Journal of Law and Economics* 19(2): 211–40.

Penikas, H. 2012. "An Optimal Incentive Contract Preventing Excessive Risk-Taking by a Bank Manager." Higher School of Economics Research Paper No. WP BRP 03/FE/2012. Available at SSRN: http://dx.doi.org/10.2139/ssrn.2049870.

Polski, M. 2003. *The Invisible Hands of U. S. Commercial Banking Reform: Private Action and Public Guarantees*. Dordrecht, Netherlands: Kluwer Academic Publishers.

Polanyi, K. 1944. *The Great Transformation: The Political and Economic Origins of Our Time*. 2001 ed. Boston, MA: Beacon Press.

Reinhart, C. M., and K. Rogoff. 2009. *This Time is Different: Eight Centuries of Financial Folly.* Princeton, NJ: Princeton University Press.

Rothschild, E. 1976. "Banks: The Coming Crisis." *The New York Review of Books*, May 27, 1976: 16-25.

Rosas, G. 2009. *Curbing Bailouts: Bank Crises and Democratic Accountability in Comparative Perspective*. Ann Arbor, MI: University of Michigan Press.

Saturday Evening Post. 1928. "The Free-Lance Allies of Wall Street." December 28, 1928.

Schlager, E., and E. Ostrom. 1992. "Property-Rights Regimes and Natural Resources: A Conceptual Analysis." *Land Economics* 68(3): 249–62.

Schwartz, H.M. 2009. *Subprime Nation: American Power, Global Capital, and the Housing Bubble*. Cornell University Press, Ithaca, NY, 2009.

Schwartz, H.M. 2010. "The New Politics of Business: From a Physical to an Intangible Economy." Unpublished University of Virginia working paper.

Selmier II, W.T. 2013. "Members Only: The Decline of Partnerships and the Rise of Club Goods Structures in Investment Banking." Working Paper W13–12. The Vincent and Elinor Ostrom Workshop in Political Theory and Policy Analysis. http://www.indiana.edu/~workshop/publications/materials/W13-12_Selmier.pdf.

Selmier, W. T., II. 2014a. "Why Club Goods Proliferated in Investment Finance." In *Research Handbook on International Monetary Relations*, T. Oatley and W.K.Winecoff, editors. Cheltenham, UK; Edward Elgar Publishing: 327-342.

Selmier, W. T., II. 2014b. "FERMiers* Required: Viewing Virtual Environments of Global Finance as Watersheds." Ostrom Workshop in Political Theory and Policy Analysis working paper, unpublished.

Selmier II, W.T., H. Penikas and K. Vasilyeva. 2014. "Financial Risk as a Good." *Procedia Computer Science* 31: 115 – 123.

Singer, D.A. 2004. "The International Politics of Harmonization: The Case of Capital Market Regulation." *International Organization* 58(3): 531-565.

Singer, D.A. 2007. *Regulating Capital: Setting Standards for the International Financial System*. Ithaca, NY: Cornell University Press.

Stigler, G.J. 1971. "The Theory of Economic Regulation." *The Bell Journal of Economics and Management Science* 2 (1): 3-21.

Stiglitz, J. (2008). "Testimony on the Future of Financial Services Regulation" *Testimony before the House Committee on Financial Services*. Available at http://www2.gsb.columbia.edu/faculty/jstiglitz/download/Oct2008_HouseFinancialServices.pdf. [Accessed: 2013-09-22].

Tilly, R. H. 1989. "Banking Institutions in Historical and Comparative Perspective: Germany, Great Britain and the United States in the Nineteenth and Early Twentieth Century." *Journal of Institutional and Theoretical Economics* 145: 189–209.

Trzcinka, C.A., & Ukhov, A.D. 2010. "Financial Globalization and Risk Sharing: Welfare Effects and the Optimality of Open Markets. Cited version presented at *Bank of Canada Conference on Financial Globalization and Financial Stability* [earlier version presented at *Ostrom Workshop*, Feb 25, 2008]"

Van Cleveland, H., & Huertas, T.F. 1985. *Citibank, 1812–1970.* Cambridge, MA: Harvard University Press.

Wallerstein, I. 1993. "Peace, Stability, and Legitimacy, 1990-2025/2050," in G. Ludestad, ed., *The Fall of Great Powers*. Oslo: Scandanavia University Press: 331-350.

Walter, A. "The Political Economy of Post-Crisis Regulatory Response: Why Does 'Over-Compliance' Vary?" University of Melbourne working paper: http://www.systemicrisk.ac.uk/sites/default/files/media/Walter-The%20political%20economy%20of%20post-crisis%20regulatory%20response%20Andrew%20Walter.pdf.

Winecoff, W.K. "Global Banking as a Complex Political Economy." Presented at the Annual Meeting of the American Political Science Association, Chicago, IL.

Winecoff, W.K. 2014a. "Bank Regulation, Macroeconomic Management, and Monetary Incentives in OECD Economies." *International Studies Quarterly* 58 (3): 448–461.

Winecoff, W.K. 2014b. "The Triffin Dilemma, the Lucas Paradox, and Monetary Politics in the 21st Century." In *Research Handbook on International Monetary Relations*, T. Oatley and W.K.Winecoff, editors. Cheltenham, UK; Edward Elgar Publishing: 89- 122.

Woll, C. (2014) *The Power of Inaction: Bank Bailouts in Comparison*. Ithaca, NY: Cornell University Press.

Woolley, P. 2010. "Why are financial markets so inefficient and exploitative – and a suggested remedy." Chapter 4 in *The Future of Finance: The LSE Report, London*: London School of Economics and Political Science. www.futureoffinance.org.uk .

Young, K. 2013. "Policy takers or policy makers? The lobbying of global banking regulators." *Business Horizons* 56(6): 691—701.

Young, O., Berkhout, F., Gallopin, G.C. , Janssen, M.A., Ostrom, E., van der Leeuw, S. 2006. "The globalization of socio-ecological systems: An agenda for scientific research." Global Environmental Change 16:304–316.

Zaloom, C. 2004. "The Productive Life of Risk." *Cultural Anthropology* 19(3): 365–391.

Table 1: Goods typology for financial products and structures		
Consumption or Usage	**Rival**	**Non-Rival**
Excludability	***Private Goods:*** Option contracts Individual proprietorship of firms	***Club Goods:*** PE, VC, mutual funds Asset-backed securities Banking partnerships Clearing Houses [NY, Suffolk, etc] Fed Window-accessing banks SIFIs, TBTF, etc
Non-Excludability	***Common pools:*** Financial risk at market level	***[Pure] Public Goods:*** Currency Central Bank oversight (?)

Source: Authors' dreams.

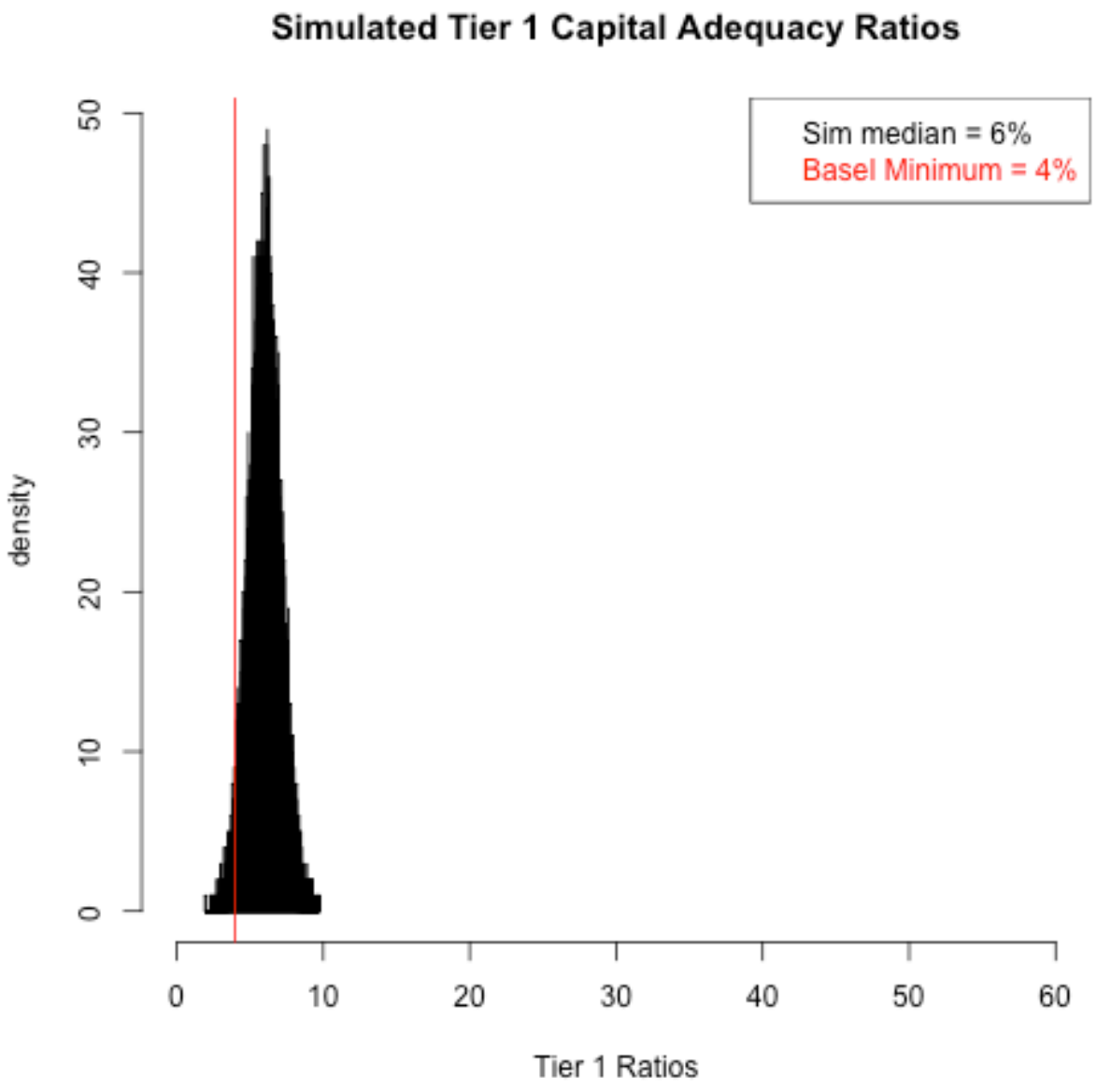
Simulated Tier 1 Capital Adequacy Ratios
Sim median = 6%
Basel Minimum = 4%
density
0
10
20
30
40
50
0
10
20
30
40
50
60
Tier 1 Ratios

Figure 1

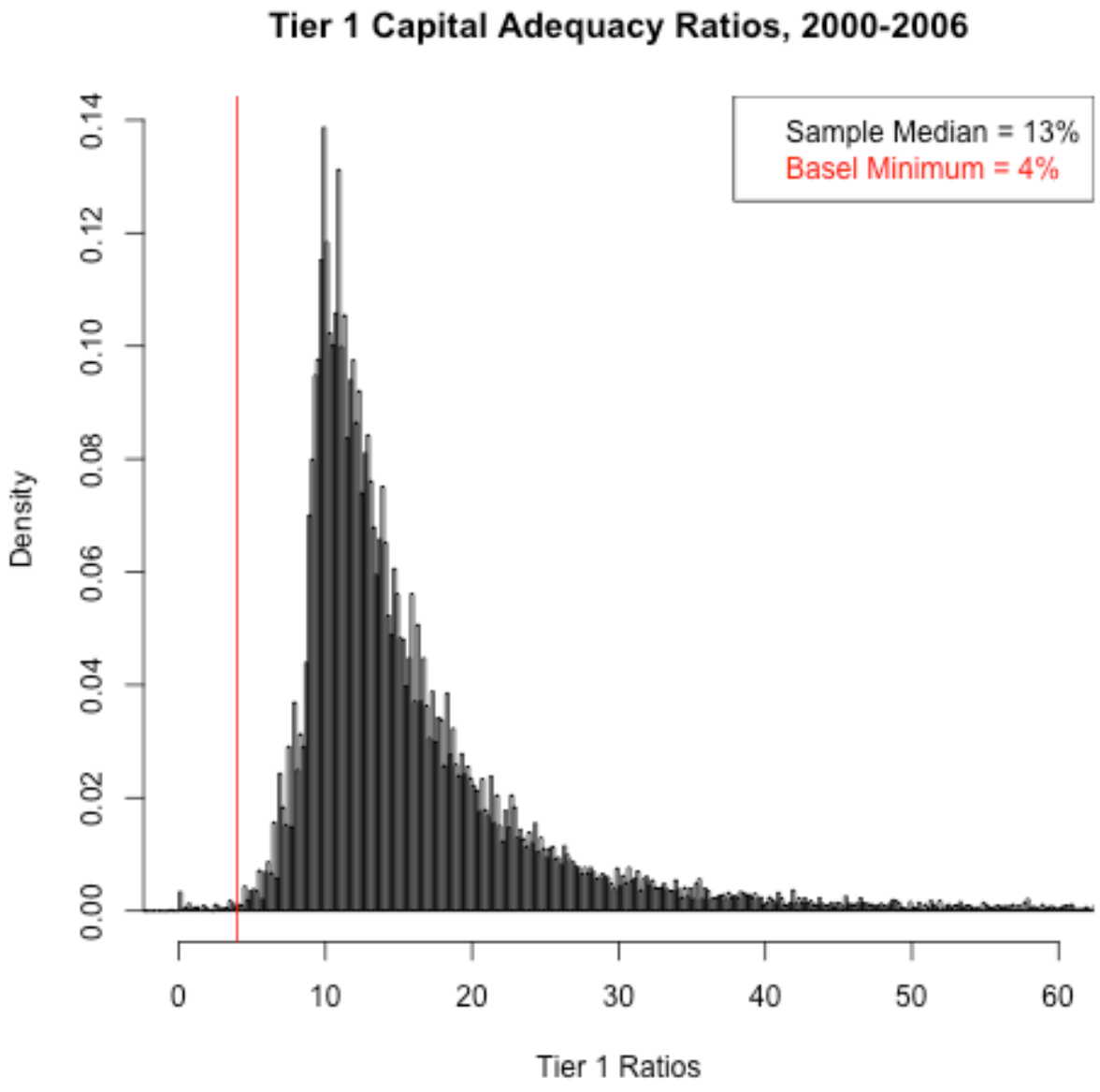
Tier 1 Capital Adequacy Ratios, 2000-2006
Sample Median = 13%
Basel Minimum = 4%
Density
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0
10
20
30
40
50
60
Tier 1 Ratios

Figure 2: