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Reading the right signals and reading the signals right: IPE and the financial crisis of 2008

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ABSTRACT

Although the meltdown in the American financial system in 2008 created the most profound financial crisis in sixty years, the field of International Political Economy (IPE) has remained curiously silent. More worrisome is the inability of the paradigmatic approach to the study of IPE in the United States – Open Economy Politics (OEP) – to shed much light on the causes of the crisis. We develop the conceptual distinction between risk and uncertainty to explain why the rationalist (and largely materialist) “American School” of IPE failed so badly. OEP followed orthodox economics in conflating risk and uncertainty. Preserving the distinction, as constructivist IPE scholars and economic sociologists have done, enables us view the crisis through dual rationalist and sociological optics. Our illustrative evidence, drawn from public (the Federal Open Market Committee of the US Federal Reserve) and private actors (accountants, credit rating agencies, and arbitrage traders) in financial markets, shows that only eclectic approaches that make use of both rationalist and sociological optics give IPE scholars the depth of vision and the breadth of imagination necessary to make sense of the financial crisis of 2008.

KEYWORDS

risk; uncertainty; financial crisis; financial markets; central banks; decision making.

INTRODUCTION

The collective performance of the field of international political economy (IPE) in the years before the crisis of the American financial system was, in the words of one leading scholar, ‘embarrassing’ and ‘dismal’ (Cohen,

2009: 437). IPE specialists were not alone in missing the signs of the gathering storm. In November 2007, economists in the Survey of Professional Forecasts estimated less than a 1-in-500 chance of an economic meltdown as serious as the one that would start a month later (Silver, 2012: 181). It is nonetheless very surprising how little scholars of IPE have had to say about the financial crisis in the five years since: with the exception of a review essay on financial market regulation (Helleiner and Pagliari, 2011), the subfield's premier journal, *International Organization*, has not published a single article on the crisis.¹ What are we to make of this curious silence about a crisis that is widely acknowledged to have been more profound than any other during the last 60 years?

The answer lies in what one might call facetiously Admiral Nelson's revenge. At the Battle of Copenhagen Nelson reportedly inverted his glass deliberately, put it on his blind eye, and then shouted, 'mate, I cannot read the signal'. We argue that the blindness of IPE to the financial crisis is rooted in a deep-seated preference to be a one-eyed king among the blind and to willingly sacrifice the depth of vision and range of imagination that comes with seeing the world through two lenses. Rationalist political economists on the one hand and economic sociologists and constructivists on the other have developed different, individually powerful, but ultimately incomplete optics through which they view the world. For rationalists the world is all about calculable *risk*; for constructivists and economic sociologists it is all about conventions that stabilize a world shot through with *uncertainty*.

We posit here that IPE's curious silence about the financial crisis that began in 2007 forces us to take seriously the idea that economic life is suffused with both risks *and* uncertainties. We advocate eclectic theorizing and reliance on *both* rationalist and sociological optics for analyzing market behavior and economic policy-making in the presence of both risk and uncertainty – the world we actually inhabit. However, since modern economics and political economy have worked hard to filter uncertainty altogether out of the analysis of markets and, increasingly, politics, we focus in this paper mainly on uncertainty and the conventions that policymakers and market actors rely on to manage uncertainty.

Mark Blyth's (2009) genealogy of CPE/IPE² posits Peter Gourevitch's (1986) seminal work as the foundation for what has now become open economy politics (OEP) – the paradigmatic approach embraced by US scholars working on economic issues (Lake, 2009a, b). Paralleling Gourevitch's work and following in his footsteps, the OEP approach pays scant attention to the complexity of preference formation and the importance of the constitutive dimension of social life, possibly because, as Blyth notes, some of its leading proponents assumed that beliefs and preferences can be read off directly from material payoffs and incentive structures.

Furthermore, that work is so closely tethered to rationalist decision theory that it fails to deal adequately with the question of uncertainty in social life. Taken separately each of these shortcomings is serious. Taken together they make it impossible to explain fully or interpret plausibly the catastrophic meltdown of the American financial system in 2008. The crisis thus creates an important opportunity for reconsidering some basic tenets in our analysis of international political economy.

Uncertainty is not the same as complexity (Blyth, 2002: 31; Dequech, 2001). The game of chess, for example, is very complex but not uncertain. The urn game devised by Daniel Ellsberg (1961), by contrast, involves simple but uncertain choices.³ Ellsberg's experiments revealed that when some basic information that would permit calculation of probabilities was missing the participants (including prominent decision theorists) failed to make rational choices (Al-Najjar and Weinstein, 2009). In uncertainty, people have to devise creative solutions and strategies. Uncertainty does not concern the limits of the human capacity to calculate but rather our lack of knowledge of the structure of the settings in which humans make their choices.

We retrace in Part 1 the history of the concepts of risk and uncertainty and recount how, over a period of half a century, risk all but replaced the concept of uncertainty in modern economic theory. We also review how the dominant IPE paradigm neglects uncertainty and thus confronts inherent limits in analyzing financial crises. Part 2 explores the distinction between risk and uncertainty as reflected in the monetary policies and discursive practices of the Federal Reserve as an agency of the state as it addresses the unavoidable ambiguities that stem from the confluence of risk and uncertainty. We show in Part 3 that risk and uncertainty appear to be very much present in many financial markets as experienced by private actors – specifically, traders, credit rating agencies, and accountants. We end with a brief conclusion in part 4.

PART 1. RISK AND UNCERTAINTY: FROM KEYNES AND KNIGHT TO RATIONAL EXPECTATIONS

The conceptual framework developed in this paper is rooted in seminal work from the 1920s, when two economists – Frank Knight and John Maynard Keynes – introduced the idea that decision-making by economic agents in situations of risk and uncertainty might differ. Knight is typically credited with making this distinction. In *Risk, Uncertainty, and Profit*, Knight's goal was to explain the puzzle of the existence of corporate profits. In a world of frictionless markets, new suppliers should enter product markets until the marginal price of a good equaled the marginal cost to make the product (Beckert, 1996, 2002; Blyth, 2002: 31–4). He explained that

successful entrepreneurs are willing to make investments with uncertain payoffs in the future, for which they can charge a premium. In the same year as Knight, John Maynard Keynes published *A Treatise on Probability*. For Keynes probability is our confidence in a conclusion given the amount and quality of the evidence in support of that conclusion. Every probability for a set of propositions lies on a continuum between complete certainty on the one end and radical uncertainty on the other. Although he believed it to be infrequent, Keynes accepted that decision-makers occasionally find themselves in situations in which there are measurable, objective probabilities for risky events. For the most part, however, Keynes argued that our tools or evidence are:

... too limited to make probability calculations: there may be no way of calculating, and/or there is no common unit to measure magnitudes ... the degree of our rational belief in one conclusion is either equal to, greater than, or less than the degree of our belief in another. (Keynes, 1948/1921: 31, 34)

How, then, do people navigate a world of fluid and fragile social and economic relations? Rather than use fixed decision rules, we rely on social devices as a way of 'getting by in the absence of definite calculable knowledge of the results of all possible current actions' (Lawson, 1985: 916). By 1937 Keynes was ready to sketch the implications of radical uncertainty for the behavior of agents in markets. Keynes noted that for classical economics, his and Knight's distinction was unimportant: 'the calculus of probability, tho mention of it was kept in the background, was supposed to be capable of reducing uncertainty to the same calculable status as that of certainty itself' (Keynes, 1937: 213). The classical assumption of decision-making on the basis of objective probabilities is only reasonable when goods are consumed 'within a short interval of being produced' (Keynes, 1937: 213). Since production and pricing decisions are repetitive and provide almost immediate feedback, the situation approximates Knight's view of decisions under risk (Gerrard, 1994: 331).

Financial assets are different. We purchase stocks and bonds to trade in the future with no way of knowing what the future price of our assets will look like: 'thus the fact that our knowledge of the future is fluctuating, vague, and uncertain, renders Wealth a peculiarly unsuitable subject for the methods of classical economic theory' (Keynes, 1937: 123). In any case, practical men and women, in Keynes's view, have no choice but to rely on 'conventions, stories, rules of thumb, habits, traditions in forming our expectations and deciding how to act' (Skidelsky, 2009: 87). All of these instill *confidence* as an essential part of Keynes's view of decision-making under uncertainty. Our expectations about an uncertain future are shaped by social factors that give us reason to have more credence that investments will yield desired payoffs. Confidence, for Keynes, 'is not a

statement about the future to be checked against actual outcomes ... [it is] a state of mind, a belief or feeling about the adequacy or otherwise of the knowledge base from which the forecasts of the future are derived' (Gerrard, 1994: 332). Because investors' decision-making in uncertainty depends on the prevailing level of confidence, a quicksilver social phenomenon, financial markets are prone to unpredictable bouts of euphoria and panic. When he looked at financial markets, Keynes did not see rational agents maximizing their utility; rather, he emphasized the role of "animal spirits" – of daring and ambitious entrepreneurs taking risks and placing bets in an environment characterized by uncertainty: that is, by crucial unknowns and unknowables' (Kirshner, 2009: 532).

Critique and evolution

Since the 1950s the reaction to Knight's and Keynes's work has followed two tracks. The first is to ceremonially invoke the distinction between risk and uncertainty and then ignore it as uninteresting or trivial (Hamouda and Smithin, 1988: 159; Hirshleifer and Riley, 1992; LeRoy and Singell, 1987: 395; McKenna, 1986). Unaffected by recent work in decision theory on ambiguity, the other reaction is considerably stronger: it rejects outright the existence of unquantifiable uncertainty and assumes that agents live only in a world of calculable risk. Most mainstream economists closed ranks around the assumption that uncertainty was analytically indistinguishable from risk (Reddy, 1996: 229).⁴ Two prominent scholars went as far as reinterpreting Frank Knight posthumously as a Bayesian.⁵ Occasional dissents came mainly from economists with actual policy experience.⁶

Why do so many economists and political scientists remain committed to the idea that we live only in a world of risk? Economic theory supplies some principled arguments. Theorists demonstrated that in economies with complete markets inconsistent:

... beliefs are not sustainable, and market forces – namely arbitrageurs such as hedge funds and proprietary trading groups – will take advantage of these opportunities until they no longer exist, that is, until the odds are in line with the axioms of probability theory. (Lo, 2007: 12; see also Blume and Easley, 2008a, 2009)

Competitive pressures will weed out market actors who fail to follow the axioms that underpin rational decision theory.

This is the view of rational expectation theory. In its strongest form it implies that an economic agent does not make any systematic error in processing information and 'has a complete information set on the 'true' deterministic component of the relevant economic structure' (Gerrard, 1994: 329). Nearly all macroeconomists, whether monetarists or 'new' Keynesians, had accepted the assumption that economic agents possess rational

expectations (Krugman, 2009; Lucas, 1980). The rational expectations ‘revolution’ had a profound effect on the emerging field of IPE.⁷ Starting in the early 1990s, however, some decision theorists reintroduced the concept of uncertainty to complement risk-based analysis.⁸ Specifically, theorists developed axiomatic models of expected utility that could accommodate the Ellsberg-type preferences that people display when probabilities are unknown (Gilboa and Schmeidler, 1989).⁹ Advances in decision theory notwithstanding, in financial economics ‘the norm still seems to be self-interested preferences, expected utility and rational expectations’ (Blume and Easley, 2008b: 13).¹⁰ The turn toward modeling ambiguity in decision theory was virtually ignored by both IPE scholars and analysts whose models were guiding economic practices on Wall Street.¹¹ Instead they continue to subscribe, more often implicitly than explicitly, to what Holzer and Millo (2005: 228) describe as a ‘reductive translation’ of uncertainty into risk.¹²

The rationalist optic

The analytical conflation of risk and uncertainty in economic theory is mirrored by the dissolution of the analytical boundaries that delineated situations of risk from uncertainty in the work of both IR and IPE scholars.¹³ Consider, for example, how Barbara Koremenos conceptualizes ‘uncertainty’ in her work on the rational design of international agreements: ‘parties always know the distribution of gains in the current period, but know only the probability distribution for the distributions of gains in future periods’ (2005: 550).¹⁴ In the Rational Design approach to the study of international institutions, uncertainty implies unpredictability. In this formulation, rational agents can contract around uncertainty by making institutional arrangements more flexible. The Keynesian/Knightian conceptualization of uncertainty, by contrast, implies that the environments facing market players and policy-makers are subject to dramatic transformations in the underlying economic structure that permanently shift the mean of the distribution. Agents have no basis upon which to settle on what the ‘objective’ probability distribution looks like in the new, post-shock environment.

The paradigmatic approach to the study of IPE – ‘open economy politics’ (OEP), as coined by David Lake – moves almost entirely in the world of risk.¹⁵ Drezner and McNamara note that ‘the OEP approach was responsible for more than three-quarters of all IPE articles published in *International Organization* and the *American Political Science Review* between 1996 and 2006’ (2013: 156). There are several assumptions undergirding the OEP approach. Domestic and foreign economic policies produce income effects that are driven by an agent’s position in the domestic and international

division of labor; this allows observers to infer the preferences of economic agents from the activity in which they earn the bulk of their income. Once they have discovered their core interests, economic actors develop well-ordered, consistent preferences. They can then move to making rational decisions as if they know the relevant probability distributions. For example, import-competing producers of tradable goods for the domestic markets will lobby for an undervalued currency and a flexible exchange rate, because they believe that there is a nearly 100 per cent probability that these policies will yield higher profits than the alternative policy scenarios (Frieden, 1991). Domestic and international institutions both aggregate individual interests and shape players' bargaining strategies. Informed by rational expectations, OEP moves almost exclusively in the world of risk.¹⁶

OEP holds a truncated view of what institutions are and what they do by focusing largely on their regulative characteristics and denying for the most part institutions' social and constitutive features. OEP thus overlooks the possibility that institutions can shape both actor identities and interests and their capacities for acting on them. We contend that questions of meaning and value in institutions and of individual and collective action under conditions of uncertainty become more accessible with an analysis that includes also the social and constitutive aspects of politics. OEP's always rationalist and often materialist conception of actor interest and its persistent neglect of social and constitutive politics are treated, at least to date, as hard core assumptions. Modifying them would mean vitiating the entire paradigm (Lake, 2009b: 231–32).

The sociological optic¹⁷

Economic sociologists and constructivist scholars of IPE, by contrast, push uncertainty to the center of attention (Beckert, 1996; Blyth, 2002). The sociological optic stresses the importance of social conventions in coping with conditions of uncertainty. Economic agents seek to 'construct stability through the development of governing ideas, institutions, norms, and conventions' (Abdelal *et al.*, 2010: 12; see also Woll, 2008: 12). Much of this work seeks to embed market actors' preferences in their social contexts (Seabrooke, 2006: 12). Economic sociologists view conventions as shared templates and understandings, 'often tacit but also conscious, that organize and coordinate actions in predictable ways', and which serve as 'agreed-upon, if flexible, guides for economic interpretation and interaction' (Biggart and Beamish, 2003: 444). Conventions simplify uncertain situations by enabling agents to impose classification schemas on the world, thereby 'delineating the set of circumstances in which it [the convention] is applicable and can serve as a guide' (Kratochwil, 1984: 688). Even when they do not supply precise decision rules, conventions have prescriptive force

by telling actors what decisions are reasonable (Steinbruner, 1974: 65–71; Herrigel, 2005: 560, 565; Herrigel, 2010: 17–23). Conventions organize behavior into observable regularities but are not defined solely by recurrent patterns; as Christopher Daase suggests, social conventions have power when ‘reflective knowledge about a certain regularity develops and enters into the practical reasoning of actors, thus constituting an independent reason for action’ (1999: 233–4).

Financial markets are complex, deeply interdependent patterns of economic and social activity. At times they are marked by radical uncertainty concerning the expectations and performance of other actors. Actors coordinate based on social conventions that stabilize expectations. Such conventions are not explicit agreements but social understandings of how to operate in contexts that are experienced as common. They are ‘attempts to order the economic process in a way that allows production and exchange to take place according to expectations which define efficiency’ (Storper and Salais, 1997: 16).

The sociological optic is also attuned to the performative role of models and other social conventions employed by market actors. Models are not only tools for analyzing markets; they also shape markets.¹⁸ Representation and action are part of the same story. That story is not only about being right or wrong in our knowledge about the world but also about being able or unable to transform that world (MacKenzie *et al.*, 2007: 2). By incorporating financial economists’ theoretical innovations into their practices, market participants brought their behavior closer to those models’ predictions, thus appearing, at least for a while, to confirm risk-based theories.¹⁹ Credit rating agencies’ descriptions of reality through their ratings make that ‘reality correspond more closely to the description’ (Rona-Tas and Hiss, 2010: 141). The ‘counterperformative’ (MacKenzie, 2006) role of models, however, can over time severely reduce their predictive power. When agents learn how the models’ predictions are made they can ‘game the system’ to open and exploit gaps between the models’ output (the credit rating, for example) and the underlying concept that it is supposed to measure (creditworthiness). In the run up to the crisis of 2008, market players learned how to ‘tweak the inputs, assumptions, and underlying assets’ to produce securitized assets that did not merit the high ratings that they had received (Partnoy, 2006: 76). As Rona-Tas and Hiss put it, ‘data on which ratings are based are produced by social actors in a social process’ (2010: 135).

The sociological optic thus counters the image of markets ‘unaffected by ongoing social relations’ in the rationalist optic (Granovetter 1992: 6). It views financial markets as environments riddled with uncertainty and stabilized by conventions; and it suggests that intentional, pragmatic agents turn to social conventions to classify events, refine their own expectations about the future, and settle on a course of action.

Eclectic analysis

Rationalist and social optics are both helpful for theorizing economic life under conditions of risk and uncertainty. It seems unnecessary, even harmful, to stipulate that only one or the other can be right. Instead their usefulness will vary by empirical domain and by how we frame our questions in the first place.²⁰ In domains suffused with risks *and* uncertainties, ‘abduction’ is a plausible way for researchers to proceed. Abduction occupies the middle ground between deduction and induction (Friedrichs and Kratochwil, 2009: 709; Finnemore, 2003: 13–5). The researcher applies concepts to the puzzle of interested action and then moves iteratively between observations and theoretical frameworks – based on careful data collection, emphasis on what is surprising in the data, and specification of mechanisms or hypothesis testing.²¹ The goal is to generate ‘useful knowledge’ that is convincing to scholars and practitioners (Friedrichs and Kratochwil, 2009: 725–6). Pragmatism about relying on different traditions of research encourages us to deploy all of the tools we have at our disposal to explain the problem at hand, rather than offering a partial view of reality that obscures or suppresses part of the evidence (Sil and Katzenstein, 2010).

The following sections illustrate the roles of uncertainty and convention in domains both public (the Federal Open Market Committee’s deliberations and communicative strategies) and private (trading, rating, and accounting practices).

PART 2. PUBLIC ACTOR: FEDERAL RESERVE POLICY-MAKING BETWEEN RISK AND UNCERTAINTY

In this section we draw evidence from two domains that were central to the crisis and its aftermath: monetary policy-making by the Federal Open Market Committee (FOMC) and the discursive strategies which the Federal Reserve has relied on to deal with the ambiguities that stem from the confluence of risk and uncertainty.

Monetary policy-making by the Federal Open Market Committee

Central banks are viewed almost exclusively through the lens of risk. At least since Kydland and Prescott’s (1977) and Kenneth Rogoff’s (1985) theoretical innovations delegation to independent central banks is treated as the route to price stability. In their decision-making process, central bankers are assumed to be able to calculate risks (Feldstein 2004).

Situating central banks exclusively in this world misses a key fact: central bankers understand that they are making decisions in the presence of risks *and* uncertainties. The best source of evidence on decision-making in the

US Federal Reserve comes from transcripts of the FOMC meetings.²² The transcripts from 2003 reveal the committee members' preoccupation with uncertainty in addition to risk.

Chairman Greenspan: Most modelers are dealing with a controlled environment in which the number of variables is well short of a thousand. In the real world there are a million, and we don't know which ones are important. So it really matters. Therefore the base of information on which we act falls away, and risk aversion becomes a very predominant factor in the Committee's judgment of which way to move. (FOMC, 2003a: 37–8)

Mr Reinhart: The broader problem the Committee faces is whether it can usefully characterize the balance of risks in an environment of such diffuse uncertainty. This is territory that Frank Knight trod eighty-seven years ago . . . It may be that the current situation has transited from a sense of known possibilities with assigned probabilities – that is, risk – to Knightian uncertainty. (FOMC, 2003b: 71)

Mr Gramlich: I actually buy the Knightian uncertainty analogy and using that as a rationale for deferring the announcement of our judgment on the balance of risks . . . In my view we ought to have a call in a few weeks, and we ought to be thinking about acting even in the presence of continued Knightian uncertainty. The situation may not be convertible to nice probability distributions, but we may still have to act. (FOMC, 2003b: 79)

The FOMC transcripts also reveal committee members' attempts to communicate the degree of uncertainty in their deliberations to markets.

Chairman Greenspan: I think the bottom line here is that it is important that we communicate the fact that this is truly a period in which uncertainty as distinct from risk is the dominant element in all of our deliberations. (FOMC, 2003b: 75)

Mr Guynn: I think it's absolutely critical that the minutes that are going to come out in three weeks are faithful to the tone of the discussion and reflect the range of uncertainty I heard around the table. And I heard an awful lot of uncertainty today, from people who were on the side of thinking that we need to pause to those who felt that we need to go faster in raising the funds rate. I also am growing uncomfortable with a statement released after the meeting that doesn't seem to describe that range of uncertainty and the latitude that we need as a Committee. (FOMC, 2005a: 88)

Mr Plosser: I think that revealing a dispersion or the varying underlying policy assumptions that people are using going forward helps

on the issue of uncertainty – that the world is uncertain and that our understanding of the way the macroeconomy works is uncertain. By revealing that some underlying sets of assumptions that we on the Committee are making to get to this set of objectives are different could actually be very helpful in reinforcing the view that the future is uncertain. (FOMC, 2007: 161)

As these quotations amply illustrate, the discussions of the FOMC are not, as rationalists argue, signals sent to show commitments to various strategies of uncertainty reduction either by different members to each other or by the committee as a whole to market actors. Rather, hoping to stabilize expectations these discussions seek to build common understandings under conditions of uncertainty. At a minimum, this evidence is strong enough to shift the burden of proof to those who argue monetary authorities live only in a world of risk.

The Federal Reserve is strongly committed to the discursive stabilization of expectations under conditions of uncertainty and risk that define the politics of central banks generally.²³ During the last two decades central banks have developed communicative imperatives to deal with their core purposes of providing monetary and financial stability. Marc-André Pigeon, for example, argues that the *Wizard of Oz* is a useful parable about the power of central banks and their allies in the business press (2011: 255). Pushing the various levers and buttons of a largely ineffective monetary policy pales in significance compared to the discursive power of central banks over a compliant business press, public opinion, and markets. In this endeavor central bankers exemplify the power of rhetoric that characterizes economics in general (McCloskey, 1994). Central bankers use the theory of rational expectations in their discursive efforts to construct market actors' expectations. In Hall's words, to the extent that rational expectations 'has become the only language in which central bankers and monetary economists may 'credibly' speak, the theory itself has become a social convention' (2008: 183). Through their discourse central banks seek to create self-fulfilling policies, aided by a public that is attentive to the banks' discourse (Holmes, 2013). Compelling narratives are important resource for strategically influencing the expectations and practices of market participants. As Allan Blinder noted, 'perhaps the best a central bank can do is to 'teach' the market its way of thinking' (2004: 25). Discursive politics thus is a powerful instrument at the disposal of the Federal Reserve, and not only under the Chairmanship of Alan Greenspan.

Mitchel Abolafia (2004, 2010, 2012) has highlighted these interpretive techniques in his analysis of how the Federal Reserve coped with crises in the late 1970s, early 1980s, and early 2000s that left economists deeply confused and conflicted. His analysis of the transcripts of the FOMC leads him to conclude that 'the existence of confusion and uncertainty are

strategically obscured from public view to maintain the more mythic view of technical rationality' (Abolafia, 2012: 94). In each case, policy-makers needed to both make sense out of a new economic environment and at the same time shape the views of others who were watching. The process was inherently conflictual, within the Federal Reserve and also between the Federal Reserve and market actors. It was a conflict less over discrete preferences and more over shared meanings. The transcripts of the 1982 FOMC meetings, for example, show how Chairman Paul Volcker helped break the way conventional economic analysis had framed policy in the midst of a deep recession. Confusion and the lack of viable alternatives led to a process of collective questioning by members of the FOMC. Volcker reframed the issues by denigrating the importance of conventional monetary targets as inherently unknowable, pressing for a lowering of interest rates, evoking the memories of 1929 as the relevant comparison for the deep world-wide recession of 1982, and underlining the importance of uncertainty in an era of transition.

From what we know of the operation of the FOMC during the last three decades, persuasive narratives are central to the effort of central banks to manage expectations in an unavoidably uncertain and risky world. Since the Federal Reserve works through markets, perceptions of market players are very important. The general pattern of accommodation of the Federal Reserve to the needs and views of the financial sector, evident in the Fed's continuing monitoring of the struggles of major firms, observed during the financial crisis after 2007 (Jacobs and King, 2012: 8–9), is only one part of the story. The other is captured by Alan Blinder's description of markets as 'giant biofeedback machine' that monitor and publicly evaluate the policies of the Fed (Blinder, 1998: 62). This evaluation occurs for better and for worse. On the positive side, secrecy and insularity have given way to openness and transparency as facilitators for educating market players and increasing the efficiency and efficacy of the Bank's monetary policy machinery. Under fortuitous conditions this can lead to a virtuous circle where monetary policy and market reactions feed on each other.²⁴ Secrecy is no longer the byword of central banks (Blinder, 2004). In the interest of both effectiveness and accountability, greater openness and transparency on all matters of central bank policy are now setting the standards of best practice (Blinder *et al.*, 2001).

During his long tenure Chairman Greenspan perfected the skill of 'talking to markets' (Greenspan, 2003 quoted in Mankiw, 2006: 17; see also Blinder and Reis, 2005: 6–9). Stories stabilize expectations. Its experience, frank admission of complexity, seasoned judgment, and resolve in crisis all give the Federal Reserve an authority to rely on the stories it tells to generate faith in a future that is unknown and unknowable and which promises rewards and imposes risks that defy wholly or in part accurate calculation.²⁵ Central banks do not send signals to reduce uncertainty.

They attempt instead to shape what Beckert (2012: 18–9) calls ‘contingent expectations’ that govern decisions made under conditions of uncertainty. Based on indeterminate interpretations these expectations are rooted in beliefs that are ultimately incalculable and that are driven as much by the future as the past. In sum, central banks exercise social power in and over the economy not simply by shaping price information from and in risky markets but by negotiating with markets over the interpretation of indeterminate situations under conditions of uncertainty (Hall, 2008).

PART 3. PRIVATE ACTORS: ACCOUNTING, RATING AND TRADING BETWEEN RISK AND UNCERTAINTY

Beyond the world of central bank policy our argument draws on confirming evidence found in the practices of private actors in accounting, rating, and trading that are reflecting the existence of both risk and uncertainty. Statistical and mathematical calculations, social conventions, or some combination of both vary in the practices of competent actors. Calculation and convention can exist in parallel without significant mutual interference; they can evolve symbiotically, forming coherent wholes; they can form hybrid interactions with one another; and they can exist in relations of mutual subordination (Adler and Pouliot, 2011: 6–8, 19–21). Practices, in the plural, refer to the habitual and routinized actions shared by a group of people (Beckert, 2011: 2). Practice, in the singular, refers to the contingent, and often creative, part of human existence that plays itself out case by case. In financial economics, calculative and conventional practices include representational models of action that can be both rational and fictional. In contrast to literary fiction, imagined future states of the world often remain undisclosed, are seen as separate from the real world, and are perceived as naturalized representations of the future (Beckert, 2011: 2). Without reducing uncertainty, fictions can provide parameters for choices in an uncertain world. Although they are non-verifiable, they can help in the emergence of new practices. Calculation and convention can be unselfconscious, based on unspoken ‘tacit’, ‘local’, ‘background’ or ‘common’ knowledge that express differently structured life worlds; or they can be very self-conscious.

Accounting

The history of accounting reveals stable periods during which risks are clearly calculable, information objectives are uncontested and accounting is reduced to the providing of answers in a set of practices that is technical and highly professionalized. In times of crisis, however, accounting is marked by profound uncertainty, and public outrage makes it difficult to think of accounting as an esoteric profession. When markets turn illiquid

or disappear altogether and the very standard of measurement by which accounts are kept collapses, as it did in 2008 and 2009, how can accounting practices assess the value of assets? Answers to this question have remained long in coming for one simple reason (Miller, 1998). The standards of accountability by which actors assess value and risk is a variable story of evolving epistemic conflicts, claims, and consensus that shape and are shaped by the economy. Far from a mechanical exercise in counting, accounting is an interpretative art of reading and manipulating accounts (Véron *et al.*, 2006). Accounting consists of historically contingent practices of calculation that allow us 'to describe and act on entities, processes, and persons' (Chapman *et al.*, 2009: 1). Accounting does not so much represent economic reality as shape it.²⁶

Spurred by and reflective of the global rise of the American economy in the twentieth century the social purpose of accounting practices has shifted its emphasis, from the protection of creditors and the guarantee of prudent stewardship to the provision of information for investors. This entailed dealing with a difficult issue – finding an appropriate measure of value. For many decades the standard had been historical costs. But since it was so inaccurate over time it remained a default standard that yielded to a series of piecemeal solutions that left simply a multitude of incomensurable measurement conventions. From the 1960s on the push for a uniform asset-liability measure of balance sheets and market valuation was particularly strong in the United States. During successive decades of financial globalization this innovation spread to many other economies. Together with and as a consequence of this shift in accounting the very nature of the firm was reimagined as a set of tradable rather than specific assets. 'Creative accounting' overstated assets, inflated earnings reports, and led to a crisis for accounting in the wake of the Enron fiasco (Véron *et al.*, 2006: ix–xiii). The rise of financial economics with its presumption of the absence of uncertainty in a world of calculable risk created a growing distance between analytical abstraction of finance economics and the empirical complexity of accounting practices. Yet over time investors found that the usefulness of abstracting from the world, of capturing complex issues of valuation in a few simple numerical ratios, was simply too attractive. Business schools taught the new models and MBAs implemented them in the world.

In the guise of the 'fair value' controversy the financial crisis that started in 2007 raised to renewed prominence the issue of measuring value. Fair value is an imaginative construct that is deeply embedded in finance economics but only coincidentally observable in market prices. When markets were flush with liquidity 'fair market value' had established itself quite readily. Idealists championing the simplicity and coherence of the new standard prevailed over pragmatists pointing to variable practices on the ground (Power, 2012: 300–5). With markets turning down sharply or

illiquid, should mark-to-model valuation take the place of no longer operative mark-to-market valuation?²⁷ In the absence of strong opposition the institutionalization of fair value accounting was not undermined by the financial crisis. In the future, pressures on this accounting standard are more likely to come from within the accounting profession broadly conceived than the national or international regulatory bodies that are in charge of setting transnational standards (Nölke, 2010). For now 'the management of organisations', one study concludes, 'is rapidly being transformed into and formalised around the management of risk, while much of the management of uncertainty occurs through a variety of hybrids that reside beyond the formalized practices of risk management' (Miller *et al.*, 2008: 683). In sum, as an interpretive and highly variable set of contested practices accounting moves in worlds marked by both risk and uncertainty.

Credit rating

The rating industry – with Moody's, S&P and Fitch as the three largest firms – is indispensable for contemporary finance (Carruthers, 2011; Ditttrich, 2007; Hill, 2004; White, 2010; Caprio *et al.*, 2010; Sinclair, 2005). Its main purpose is to transform uncertainty into risk. During the financial crisis that started in 2007, it proved to be spectacularly wrong in providing both clients and regulators with quantitative estimates of the credit-worthiness of various financial products (Silver, 2012: 26–30, 45). These estimates were based on assumptions and simplifications, which in different forms had also been present in the spectacular collapse of Enron in 2001 and in the devastating Asian Financial Crisis of 1997. Despite these conspicuous failures the rating industry has been left largely unaffected by the intense political discussions and regulatory changes that followed in the wake of financial markets' convulsions in the fall of 2008. Deeply flawed as their ratings have proved to be for clients and governments, it seems, these actors cannot do without the ratings the agencies provide. While criticisms of the performance of the rating agencies have been widespread, few have been able to come up with viable alternatives. The promise and allure of attempting to transform uncertainty into measurable risk remains very strong.

At their best, rating agencies provide information that enhances rational decision-making and makes markets more efficient. Starting in the middle of the nineteenth century firms began to offer the rating of the credit of counterparties first, later bonds and mortgages, and most recently of a wide spectrum of financial products that embody different kinds of risks. Take for example the mortgage industry boom that doubled the profits of the three main rating agencies from \$3 billion in 2002 to \$6 billion in 2006. In fact Moody's profit margin was larger than that of any company in the S&P top 500 corporations for five years in a row (Waxman, 2008: 2; Partnoy,

2006: 64–8). Unavoidably this process has always required simplification of information. In the case of corporate bonds the data showed that ratings predicted actual defaults reasonably well (MacKenzie, 2011: 1811). But the financial crises which have rocked markets in the last two decades showed that the agencies failed badly in the rating of new financial instruments such as collateralized debt obligations (CDOs).²⁸

While the technologies of simplification have changed enormously, the upshot was the same. Market uncertainties were ‘domesticated’ into manageable risks and thus were believed to have been ‘conquered’ (Carruthers, 2011: 4; Hill, 2010: 14). Since the 1980s financial innovation loosened the links between creditors and lenders. Illiquid debt and the associated risk no longer marked specific relationships but became disembodied and was captured in dizzying arrays of new products that were highly liquid, could be easily traded in markets and were difficult to understand. This change enhanced the importance, size and profitability of rating agencies.²⁹ The spread of the securitization of risk in a broad range of new products made the information that rating agencies provide more important than ever before (Sinclair, 2005). Since new products like CDOs were complex, investors were eager to have them rated so as to better assess their inherent degree of risk. Rating agencies applied the well-known labels to the new products with which they had classified corporate and government bonds for decades. In general the mixing of different credit risks contained in the different tranches of credit risks pooled in new products resulted in substantially higher credit ratings than the underlying assets; more than half of many of the bundled sub-prime securities were rated AAA rather than just the 10–20 per cent of the total package that might have deserved such ratings (Willett, 2012: 47).³⁰ Higher ratings made the new products more attractive to investors and more profitable to both investment banks and rating agencies. The greater complexity of the new products made them harder for investors and bankers (and raters) to understand and more profitable for rating agencies to rate (Carruthers, 2010: 10).

Furthermore, some CDOs were pooled, tranced, and packaged together with credit default swaps, creating complex hybrid products (referred to as CDO²s). This led to a growing discrepancy between the risk that was being securitized and the quality of the underlying asset; furthermore, it created a multiplier effect for possible errors (Carruthers, 2010: 13). One study reports that 70 per cent of the securitized assets in the sample studied were rated AAA while 93 per cent of the underlying assets had a credit rating of B or lower. The authors use the term ‘alchemy’ to describe the mismatch between the credit ratings of the securitized products and the credit quality of the underlying collateral. They speculate that the mismatch is driven by a boilerplate model that targeted ‘the highest possible credit rating at the lowest cost, while catering to investor demands’ (Benmelech and Dlugosz, 2009: 3–4). This process further enhanced the

profits and political clout of the financial sector and the rating agencies. Government deregulation at the international and domestic level was driven by the demand that the new securitization technology made government regulation largely unnecessary. The renegotiation of the Basle II agreement in 1996 transformed the conventional belief that risk analysis could be safely left to the models employed by the large banks and the ratings agencies into soft law governing the global financial system.³¹ Chairman Greenspan was a powerful advocate of this convention. The social context of finance was international, bipartisan and had hurdled the separation of powers. Thus lead was spun into gold (Porter, 2010).

In this process rating agencies disregarded important differences that did not warrant a rating scheme deceptively similar to the traditional rating of corporate bonds. After a few years especially sub-prime mortgage-based CDOs defaulted or were downgraded at an alarming rate. Uncertainties in this market, it turned out, had simply been assumed away until markets turned sour. The different processes by which the agencies rated asset-backed securities (ABS) and CDOs showed how complex and incomplete the domestication of uncertainty had been (MacKenzie, 2011). In the end, behind the veil of highly technical analysis the agencies also bought into the view, widely shared among homeowner, bankers, media, government bureaucrats and politicians of all stripes that house prices could only go up. Providing even high-risk mortgages was deemed to be quite safe since homeowners would, within a few years, acquire considerable equity, which would diminish the risk of default. It was an era in which everyone thought of a home like a personal ATM machine. In addition the models from which default risk was estimated were based on relatively recent time series data (Rona-Tas and Hiss, 2010: 130).³² The models had technical flaws related to assumptions that were convenient for making them behave well rather than more accurate (Derman, 2011). Furthermore, the agencies were not cognizant of potentially high correlations across different asset classes in both good times and bad. When interest rates increased after a prolonged period of easy credit and growing market mania, a cascade of defaults in the subprime market spread quickly to other asset classes and eventually led to a panic that suppressed lending throughout the economy (Gorton, 2010; Sinclair, 2010).

Trading

More than anybody arbitrage traders are experiencing first-hand the two worlds of risk and uncertainty. This starts with the financial sector's difficulties to articulate accurately the risks of their products. In times of crisis that difficulty threatens the viability of banks because it increases uncertainty about the size of bank assets (Lépinay, 2007: 88). Furthermore, just as traditional value investors and momentum investors have different ways

of determining economic value, modern arbitrage depends on the possibility of interpreting securities in multiple ways. 'Like a striking literary metaphor, an arbitrage trade reaches out and associates the value of a stock to some other, previously unidentified security' (Beunza and Stark, 2005: 87). The cognitive flexibility that trading requires is a modern-day reflection of entrepreneurship grounded in the Knightian distinction between risk and uncertainty. An entrepreneur, for Knight, is not rewarded for risk taking but for her ability to exploit uncertainty. In the Wall Street trading room of a major international investment bank this aspect of entrepreneurship is re-expressed in the institutionalized ability to keep multiple evaluative principles in play. This is accomplished through organizing traders into multiple teams with different tasks that constitute different communities of practice committed to different evaluative principles. Operating in one context this makes possible learning across different communities within one organization (Beunza and Stark, 2005: 90–2).³³

Furthermore, as Beunza and Stark argue, the same principle operates also outside of the trading room. Traders engage in reflexive modeling (see also Buck, 1963). They compare their best principle of evaluation and bet against that of the market as reflected in price spreads. When the spreads narrow other traders share their assessment and the trader is going to make money; when the spreads do not narrow, the trader is going to lose money and will have to reevaluate her initial evaluation or take the loss (Beunza and Stark, 2012a).

Successful trading can move markets and thus create self-fulfilling prophecies, bubbles, and, eventually, spectacular crises (Hardie and MacKenzie, 2012: 189). In the run-up to the creation of the EMU traders recognized that the prices of southern European and German bonds were bound to converge, with Spanish, Italian, and Greek prices falling as those countries were bound to benefit from the reputation and practice of German fiscal rectitude. As a consequence southern European bond prices increased and yields fell. Everybody gained as risk taking led to rewards for traders, governments, and financial markets – until the music stopped with the onset of the Eurozone sovereign debt crisis in early 2010.

Unwittingly traders can also create the very uncertainties that their trading in risk is supposed to mitigate. This was the case in the near collapse in 1998 of one of the largest and most successful hedge funds of the day, Long-Term Capital Management (LTCM) (de Goede, 2001; Lowenstein, 2000: 143–60; Holzer and Millo, 2005: 235–9). Across very diverse asset classes held worldwide the unwinding of arbitrage positions caused very large, highly correlated price movements. The reason was that the very success of LTCM had led to widespread imitation which created partially overlapping arbitrage positions and much higher rates of correlation among diverse asset classes than the traders at LTCM were aware of. When Russia defaulted on its ruble-denominated bonds and

then devalued the ruble, the ensuing market preference for safe and liquid investments led to a self-reinforcing downward spiral of asset prices in various markets that required a massive bailout of LTCM by some of the world's largest banks (MacKenzie, 2005: 65, 69–74). LTCM's risk management models were conservative and profitable. The fact that they were open to imitation proved to be the undoing of the fund. Imitation led to cognitive interdependence, overconfidence, and, ultimately, collective failure (Beunza and Stark, 2012b). This social dimension of trading can be reinforced by the importance of common social and educational backgrounds and geographic proximity that can reinforce tendencies to herding and hubris (Carruthers, 2010: 17–20). Arbitrage could not remain a self-contained economically rational strategy. In the end it remained firmly embedded in a larger social context thus linking risk and uncertainty.

Since the worlds of risk and uncertainty are intermingled, it comes as little surprise that the boundary that separates arbitrage (risk-free trading), hedges (risk-reducing trading) and speculation (risk-seeking trading) is porous – and not only on Wall Street. In his analysis of Japanese traders Hirokazu Miyazaki (2013: 8; see also Miyazaki, 2007: 399) was struck by 'the ambiguous and constantly shifting conceptual boundaries of the category of arbitrage vis-à-vis the broader category of speculation'. What is true of practice is true of product. Vincent Lépinay's research on the trading of new financial products in a French bank reports 'that no one knows for sure how best to describe these products. The problem is not a paucity of descriptions, but rather an embarrassment of riches' (2011: xix). Managers who intervene because traders are incurring losses are doing so even when traders try to convince them that the losses are temporary and will soon turn into gains. Yet managers often cannot discern when traders have stopped acting as arbitrageurs and started acting as speculators on the rise or fall of prices. The limits of arbitrage arise when a rational and prudent trader faces uncertainty whether, when, and to what degree peers will join in exploiting a common arbitrage opportunity that the trader has spotted.

Caitlin Zaloom provides an ethnographic account of the world of traders. In that world risk-taking and speculation are inseparably intertwined. 'To work with risk', she writes, 'is to engage fate and to play with the uncertainties of the future . . . Rationalized risk-management markets establish the conditions for speculation in financial contracts' (Zaloom, 2006: 93, 94). Indeed, the very perspective on the management of risk diverts our attention away from the untoward consequences of uncertainty that can upend even the most nimble, attentive, and disciplined trader. In futures markets, traders run often up against the inherent limits of fully objectifying and containing uncertainty (Zaloom, 2006: 95). The institutionalization of imitation in the world of traders is an existential condition in the unending search for what often turns out to be fool's gold (Rao *et al.*, 2001).

PART 4. CONCLUSION

Between 1650 and 1790 a number of British social theorists invented an idea that today is taken for granted as a permanent and unquestioned feature of political economy: risk and agency have replaced fate and fortune as a way of understanding and controlling the future (Bernstein, 1996; Nacol, forthcoming). Risk management centers on the 'continuing absorption and production of uncertainty' (Kessler, 2011: 2177).

Living as we do in a world of risk *and* uncertainty it is unwise to pretend otherwise. In a complex world only eclectic approaches that rely on both rationalist and sociological optics gives us the depth of vision and the breadth of imagination to recognize important problems and to propose plausible answers. The 'abductive' approach to theorizing provides a way for IPE scholars to draw on powerful rationalist models when the underlying conditions meet the probabilistic assumptions of risk-based analyses and on the analysis of social conventions with which market actors respond to unseen or unforeseeable events.

For George Soros, one of the world's most successful financiers, market participants seek to impose some order on an unknowable future (Soros, 1998).³⁴ The conventions that inform market expectations do not mirror underlying economic fundamentals; rather, the partial and distorted views that economic agents impose on the world shape markets. In 'reflexive feedback loops' (Soros, 2009) these views drive markets, which then subsequently shape beliefs and thus can generate far-from-equilibrium situations. Nobel laureate Robert Solow (1999) takes Soros to task for a multiplicity of sins and calls his work 'embarrassingly banal'. Reading Soros's book and Solow's review is like watching the two proverbial ships of economic sociology and rationalist economics pass at night. Solow's incisive review glosses over the central point in Soros's argument. Unlike the risk-based economic models that Solow references, Soros assumes knowledge in and about financial markets to run up against fundamental uncertainty.

At times, those ships can pass at night even in the mind of the most seasoned and smartest of policy-makers. Alan Greenspan, for example, writes that:

... uncertainty is not just a pervasive feature of the monetary policy landscape; it is the defining characteristic of that landscape ... In practice, one is never quite sure what type of uncertainty one is dealing with in real time, and it may be best to think of a continuum ranging from well-defined risks to the truly unknown. (Greenspan, 2004: 36-7)

Yet in the very next paragraph Greenspan contradicts his starting premise by insisting that monetary policy is an exercise in risk management and an application of Bayesian decision-making. It is thus no surprise that

in different situations key actors like Greenspan are prone to emphasize one concept at the expense of the other. In 2005, for example, he extolled advances in financial risk management, arguing that ‘increasingly complex financial instruments have contributed to the development of a far more flexible, efficient and hence resilient financial system than one that existed just a quarter of century ago’.³⁵ Two years later, at the height of the financial crisis, Greenspan argued instead that risk management models were not suited to model volatile markets oscillating sharply between euphoria and fear (quoted in Engelen, 2009: 130; see also Hassoun, 2005). Fully aware of the importance of uncertainty in his long tenure as head of the Federal Reserve, Greenspan neglected to even mention the concept in a long paper published in 2010 soon after he left office.³⁶ Greenspan’s unsteady stance reflects oscillation between the two optics of risk- and uncertainty-based models.

The distinction between risk and uncertainty characterizes not only financial economics but also many other fields including insurance, counterterrorism, climate change, science and technology policy and environmental law (Katzenstein and Nelson, 2013: 251). Broadly speaking, calculable risk is a defining aspect of late modernity and characteristic of modern forms of governmental power that eschews the logic of exclusion and discipline in favor of the logic of calculation. Radical uncertainty, however, is a specific form of indeterminacy that requires novel forms of power grounded in individual prudence and responsibility (Best, 2008: 358–9; Reddy, 1996). A financial world that mixes calculable risk with unknowable uncertainty creates novel ambiguities that ask to be unraveled. If it wants to regain its voice and intellectual relevance on past, present and future financial crises IPE scholarship must learn how to encode and decode such ambiguities by taking account of both risk and uncertainty.

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NOTES

- 1 The point is made also by Daniel Nexon: <http://duckofminerva.blogspot.com/2011/08/state-of-field.html>. Herman Schwartz has noted similarly that of the approximately 11,000 papers presented between 2002 and 2008 at the annual meetings of the American Political Science Association fewer than 30 dealt with issues central to the global financial crisis (personal communication, 31 December 2012). Manokha and Chalabi (2011: 8, 25) report similarly striking findings for the top 20 IR journals in the years of 2008–2011.
- 2 For Blyth, the disciplinary distinction between comparative and international political economy is more semantic than substantive.
- 3 In Ellsberg's (1961) experiment participants preferred to take a bet when the odds were known over bets with unknown odds. The result violated the axiom that people make decisions as if they had assigned probabilities to each event.
- 4 See also Nelson and Katzenstein (forthcoming).
- 5 In LeRoy and Singell's reading of Knight's *Risk, Uncertainty, and Profit*, 'Knight implicitly accepted the modern view that by modeling individuals as able to choose consistently among known outcomes, we in effect represent them as always having subjective probabilities' (1987: 398).
- 6 For example, Allan Blinder, a former member of Federal Open Market Committee, distinguished between three different kinds of uncertainty central bankers face over forecasts, parameter values and model selection (1998: 10–13). Allan Meltzer (1982), a member of the Council of Economic Advisors in the Kennedy and Reagan administrations, also posits an important role for uncertainty in economic behavior. See also Greenpan (2004).
- 7 According to Kirshner (2011, 205), a central tenet of IpE (the small 'p' is intentional) is 'that if rational agents have access to the same information, they will reach the same conclusions about expected outcomes'.
- 8 This move was motivated, in part, by the large number of experimental studies demonstrating that people violate the axioms of rational decision theory in the presence of uncertainty. The experimental literature is too large to survey here; we point readers to the discussion in Nelson and Katzenstein (forthcoming).
- 9 One way that economic theorists have modeled decision under uncertainty is a max–min rule: agents select the action that performs the best if the worst-case scenario is realized.
- 10 Exceptions include Bewley (2002); Caballero and Krishnamurthy (2008); Epstein and Schneider (2008); Rigotti and Shannon (2005).
- 11 David Easley, personal communication, 29 November 2011.
- 12 Partly this is due to the practical challenges of building models that can handle non-Gaussian distributions. In Lance Taylor's words, 'reliably estimating parameters that specify the form of distributions with fat tails is difficult if

- not impossible – one reason why this approach has not been widely pursued’ (2010: 12).
- 13 Ahlquist (2006); Bernhard and Leblang (2008); Bernhard *et al.* (2002); Fearon (1998); Lake and Frieden (1989); Koremenos (2005); Koremenos *et al.* (2001); Mosley (2006: 95); Rosendorff and Milner (2001); Sobel (1999). Rathbun (2007) argues that while ‘uncertainty’ is a central concept in the study of International Relations, competing research traditions in the field (realism, rationalism, cognitivism, and constructivism) define the term differently.
 - 14 We are not the first to critique the rational design project for conflating uncertainty and risk; see Wendt (2001: 1029–32) for a trenchant example.
 - 15 Lake (2009a, b). For additional reflections on the OEP approach, see Katzenstein and Nelson (2013: 238–9). Blyth (2013) and Oatley (2011) offer critical discussions of OEP that differ from our perspective.
 - 16 Imperfect knowledge economics offer one alternative. See Phelps (2007: xviii).
 - 17 This section draws on material from Nelson and Katzenstein (forthcoming).
 - 18 In Donald MacKenzie’s words they are not only ‘cameras’, passively recording, but also ‘engines’ actively transforming that reality (MacKenzie 2006: 25)
 - 19 On the self-fulfilling character of economic theories in the field of management, see Ferraro *et al.* (2005).
 - 20 We adhere here to Nancy Cartwright’s (2007: 24–42) pluralist understanding of causation and her advice to remain open-minded about the merits of both ‘clinging’ and ‘vouching’ styles of causal analysis in the social sciences.
 - 21 Abduction is an approach to theorizing about a research question – a ‘method of reasoning’ rather than a method for testing the explanation (Hellman 2009: 641; Swedberg 2012). Thus the approach is not inherently more compatible with either qualitative or quantitative forms of evidence. Though skeptical of what they view as the ‘alchemy of statistical methods’ applied to quantitative evidence, Friedrichs and Kratochwil (2009: 719) accept that both forms can be useful in an abductive research strategy.
 - 22 See Nelson and Katzenstein (forthcoming) and Katzenstein and Nelson (2013) for additional evidence drawn from the FOMC transcripts.
 - 23 ‘Abenomics’ as practiced in Japan after January 2013 is another, more explicit and perhaps more desperate attempt by a central bank to reset market expectations. See Miyazaki and Riles (2013).
 - 24 Blinder (1998: 62–75). On the negative side, Blinder notes, that markets are heavily skewed in favor of short-term gains and the Fed can do little more than reduce slightly rather than eliminate speculative bubbles.
 - 25 Economist and former central banker Alan Blinder provides much support for Holmes’s (2009) analysis of an economy of words and so does Rodney Bruce Hall’s analysis of transparency and intersubjectivity in central banking. Blinder (1998); Blinder *et al.* (2001); Hall (2008: 189–235).
 - 26 This section is very much indebted to Power’s (2012) trenchant and comprehensive overview.
 - 27 ‘Mark-to-market’ is an accounting rule stipulating that asset values must reflect current market prices. During the height of the panic market prices could not be identified, so accountants turned to indices based on buying and selling protection against subprime risk (‘ABX’) to enforce ‘marking’ (Gorton, 2010: 64, 130–1).
 - 28 Securitization produced an array of products. Mortgage-backed securities were created from pools of loans purchased from originators. CDOs involved packaging tranches of the asset-backed securities (ABS) into new instruments that could be sold by the CDO manager to outside investors.

- 29 The number of analysts employed by Standard and Poor's, for example, increased 50-fold between 1986 and 2000 (from 40 to 2,000) (Rona-Tas and Hiss, 2010: 125).
- 30 At an early date, in October 2008, the IMF estimated that of the total loss of \$1.4 trillion more than half (\$770 billion) was in mortgage-backed securities and the single largest category (\$290 billion) was in asset based CDOs (MacKenzie, 2011: 1179).
- 31 Lockwood (2013).
- 32 Models did not extend beyond 1995 (the date after which personal FICO credit scores became available for most mortgage holders), thus the time series only included data from a period in which house prices had increased (Rona-Tas and Hiss, 2010: 130, note 23).
- 33 On the advantages of ambiguity in a different context see Best 2005.
- 34 This section draws on Katzenstein and Nelson (2013: 240–1).
- 35 Greenspan (2005), quoted approvingly in IMF (2006: 1).
- 36 Greenspan (2010). For a lengthy and sympathetic assessment of Greenspan's Chairmanship of the Federal Reserve, written before the financial crisis of 2007–2008, see Blinder and Reis (2005).

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