Narrating imagined crises: Stress tests, post-crisis regulation, and cultural reform in banking

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Abstract

The scholarly consensus is that the regulatory response to the 2007-9 financial crisis has proven a historic missed opportunity for bringing about transformative reforms. This article argues that the critical evaluation risks missing how regulators' new tools and procedures are helping them to improve the governance of financial institutions. The focus is on the most significant novelty of the post-crisis period: regulatory stress testing. Guided by 13 interviews with regulators and financial practitioners involved in the Bank of England's stress tests, the article addresses its 'qualitative review' component, which informs the supervision of the UK's largest bank holding groups. Our findings suggest that the requirement for banks to provide a narrative account of their modelling and governance practices is changing those practices and succeeding in weakening the boundaries between banks' epistemic subcultures. We then reflect on how the pushback against the tests points to the limits of Jens Beckert's theorisation of the politics of expectations and requires scholars to evaluate judiciously post-crisis regulatory reforms.

Keywords: Financial regulation, central banks, stress testing, risk modelling, epistemic culture, fictional expectations

Introduction: post-crisis regulation as a historic missed opportunity?

The ten-year anniversary of the outbreak of the 2007-9 global financial crisis provides an opportunity to reflect on the progress made by governments to prevent its repetition. There has of course been no lack of new rules and procedures: from the 848 page Dodd-Frank Consumer Protection Act in the United States to waves of revisions to the transnational Basel Accords governing capital adequacy (now entering their fourth incarnation). Central bankers and senior regulators do in fact tend to be quite satisfied that the reforms, while imperfect, have helped make the financial system more resilient. However, the upbeat tone of policy actors stands in stark contrast to the increasingly critical consensus emerging in scholarly circles. Despite initial enthusiasm for the post-crisis 'macroprudential' agenda (a newfound concern with systemic risk in the financial system as a *whole*; see Baker, 2013; Helleiner, 2011; Lothian, 2012), more recent work focuses on the failure of the 'status-quo

crisis' to translate into a suitably radical response to the largest banking crisis since the Great Depression (Helleiner, 2014). Indeed, even within the limited scope of the reform programme, almost every aspect of post-crisis regulation has been judged inadequate. The perpetuation of the shareholder value model in financial services (Ertürk, 2016); the continued reliance on pro-cyclical, market-based standards (Underhill, 2015); and the only limited attempts to reign in shadow banking (Gabor, 2016) – taken together, these studies represent the regulatory response to the crisis as a historic 'missed opportunity' (Admati, 2016).

This article argues that even if critics are not wrong to point to the limits of post-crisis reforms, they risk missing the benefits of the new tools and procedures regulators have introduced since the crisis to augment their knowledge and improve the governance of financial institutions. With the discrediting of the neoclassical economic theory blamed for encouraging complacency in regulatory circles, the financial stability wings of central banks have taken the lead in seeking new ways to know and understand the resilience of the financial sector and its cyclical dynamics. These knowledge augmentation technologies run the gamut from agent-based modelling of the banking sector (Haldane and May, 2011; Bookstaber et al., 2014) to attempts to develop early warning models for systemic risk (Alessi and Detken, 2014). However, perhaps the most significant, or at least immediately operable, novelty of the post-crisis period is regulatory stress testing. The first regulatory stress test, the Supervisory Capital Assessment Programme (SCAP), was conducted by the U.S. Federal Reserve in 2009. In response to the credit crunch, the Fed devised an adverse hypothetical scenario and simulated its effects on the balance sheets of nineteen bank holding companies. By exposing weaknesses in capitalization and recapitalizing the most fragile institutions, the test has been credited as a turning point in the crisis (Blinder, 2013; Langley, 2013; Geithner, 2014; Bernanke, 2015). Building upon the SCAP's success, regulatory stress testing was then institutionalized in banking supervision. The Federal Reserve's annual Comprehensive Capital Analysis and Review (CCAR) process became the global stand-bearer in 2011, and it has been followed by the stress testing programmes initiated by the European Banking Authority in 2011 and the public stress testing programme of Bank of England from 2014.¹

Today, the results of the stress tests dictate the rhythm and urgency of public discussions about the state of the financial system. Yet widespread recognition of their

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¹ Before 2014, the Bank of England coordinated a private stress testing programme with the major UK banks.

importance has not been matched by public or social scientific knowledge of exactly what the practice involves; the details are left in a black-box. The same holds with regard to the reception of the results. Whether taken at face value, or subjected to a hermeneutics of suspicion (with, for example, criticism by Bookstaber et al. (2013), Glasserman and Tangirala (2015) and Tett (2015a) that they have become predictable), the evaluative standard for judging the efficaciousness of the tests concerns the extent to which a bank's capital ratio figure in the adverse scenario provides an accurate representation of the resilience of its balance sheet to future shocks. While not wishing to downplay the central role of the tests' quantitative aspects, this paper addresses one of the most significant, yet frequently overlooked, developments in post-crisis stress testing: the growing importance of its qualitative aspects. The qualitative assessments require banks to supplement their capital ratio projections in the stress scenario with a written, narrative account to the regulator defending their assumptions, choice of models and governance procedures. These reports are then used by regulatory supervisory teams in their on-site visits to discuss banks' governance of the stress testing process. In the Fed's CCAR, if the response to the qualitative test is judged inadequate a financial institution can be publically failed and sanctioned. The results of the Bank of England's qualitative review carry no formal penalties, but they feed into the capital requirements set for individual banks.

Beyond providing assurance that banks executed diligently the tests, this article asks: what are the deeper intentions and effects of these qualitative assessments? Informed by an extensive review of regulatory documents and thirteen interviews with regulators and financial practitioners involved in the Bank of England's stress tests, we show that the requirement for banks to provide a narrative account of their modelling and governance practices is an attempt to provide supervisors access to the Goffmanian backstage of banks' risk management departments 'where the regulated strategically engineer data and information' (Thiemann and Lepoutre, 2017, p. 1781). Just as importantly, our findings suggest that that the resulting intertwining of calculative and narrative practices is encouraging financial firms to break down the organizational knowledge silos which global regulatory institutions (BCBS, 2009; SSG, 2008), as well as popular commentators such as Gillian Tett (2015b), have identified as an important reason why many banks failed to appreciate the risks they were taking in the run up the crisis. To comply with the stress tests' qualitative assessments, quants' modelling practices have been opened up to risk managers; risk and finance departments have had to consolidate their approaches; and banks' governing boards are now forced to demonstrate that they can join the dots across their large and sprawling institutions. Following MacKenzie (2011) and MacKenzie and Spears's

(2014) work on the diverse and sometimes incommensurable ‘clusters of evaluation practices’ that cut across banking institutions, we conceptualise these changes as a weakening of the boundaries between financial firms’ epistemic subcultures. The significance of these insights is explored in the final section, which addresses the pushback against the tests by financial interests who focus on the tests’ failures as predictive devices (Dowd, 2015a, 2015b; CCMR, 2016). We show that although these criticisms misconstrue the tests’ purposes, they point to the limits of the notion of ‘fictional expectations’ (Beckert, 2013, 2016). To make sense of the backlash against stress testing requires a more conflictual account of how private actors contest the narratives of public authorities. We conclude with a plea for scholars to adopt a more balanced appraisal of the merits of post-crisis regulation in the face of increasing pressure to roll back the reforms.

The discussion begins by outlining the study’s theoretical and empirical contribution to the literature. The third section presents the research methodology. The fourth focuses on narrativization in scenario design and macroeconomic expansion. The fifth explores the effects on governance practices. The sixth examines criticisms of regulatory stress testing. The final section concludes.

Theorising regulatory knowledge practices

There is widespread recognition that in the decades preceding the financial crisis problematic knowledge gaps opened up between regulators and financial firms (IMF and FSB, 2009; Becker, 2016). Engelen et al. (2012) go further. Regulatory knowledge was not just insufficient and technically flawed; the crisis was a result of increasing financial complexity and the lack of democratic control over the markets. Thus, for a time it was hoped that regulators might take steps to decomplexify financial markets and open up their governance to public deliberation (Schneiberg and Bartley, 2010; Ertürk et al., 2011; Dorn, 2012). When such a transformative agenda failed to materialise, the focus shifted to how the regulatory response to the crisis has failed to even ensure the safety of the financial system (Lall, 2012; Admati and Hellwig, 2013; Mészáros, 2013; Moschella and Tsingou, 2013; Helleiner, 2014; Underhill, 2015; Admati, 2016; Ertürk, 2016; Stellinga and Mügge, 2017). Nevertheless, despite scholars seeing more continuity than discontinuity between pre- and post-crisis regulatory regimes, there is recognition that the crisis conjuncture gave birth to a new set of regulatory practices which need to be interrogated (Bryan et al., 2012).

Since then, work on these practices has focused on the role of central banks as market-makers of last resort and their promotion of quantitative easing programmes (Mehrling, 2011; Braun, 2016). Yet the literature has generally failed to address the knowledge augmentation efforts at the heart of what El-Erian (2016, p. xxvii) calls the ‘unthinkable transfiguration’ of regulatory institutions since the crisis. For instance, little has been said about the U.S. Office of Financial Research, instituted by the 2010 Dodd-Frank Consumer Protection Act, the mission of which is to ‘shine a light in the dark corners of the financial system’ (OFR, 2017, n.p.). Regulatory stress testing has been similarly neglected. Despite becoming one of regulators’ most powerful levers of control over financial firms – in which failure can result in financial institutions being required to amend their planned share-buybacks and dividend payments (Dent et al. 2016) – when stress testing is mentioned in scholarly discussions the results are either reported in an acritical fashion or the practice is dismissed as a symptom of regulators’ attachment to using quantitative rocket science for fine-tuning capital requirements (Admati 2016, p. R10; Ertürk, 2016, p. 3). Goldstein (2017) is an exception, providing an account of how stress testing intersects post-crisis bank-capital reform. Yet his focus on improving how capital is measured in the baseline (non-stressed) scenario, leaves a question mark over whether he is even talking about stress testing. Langley (2013) has argued that stress testing is exemplary of a broader shift towards anticipatory ‘enactment-based knowledge’. But Langley’s analysis is limited to the part played by stress testing in the governance of the financial crisis; he does not address its role in the post-crisis reform agenda.

This article picks up from where Langley’s analysis leaves off, honing in on the microprudential, supervisory aspects of regulatory stress testing. The transformation of regulatory stress testing from a tool of crisis governance into a fixture of banking supervision began with the Federal Reserve’s CCAR programme in 2011. Heeding the advice of the Basel Committee on Banking Supervision, who observed that prior to the crisis banks’ own internal stress tests had become a ‘mechanical exercise’ (BCBS, 2009, p. 8), the Federal Reserve emphasise that the regulatory test aims to provide supervisors with ‘information’, ‘perspective’ and a ‘deeper understanding’ of how banks ‘form and monitor their expectations for maintaining appropriate capital’ (Federal Reserve, 2011, p. 3). The channel for these ambitions is the ‘capital plan’, which requires banks to describe their processes for assessing their capital adequacy under stress, their firm-wide risk management practices, and their governance process. This would be dubbed the ‘qualitative’ aspect of the stress test and require firms to submit a ‘complete narrative’ to the regulator describing what they would do if the imagined crisis materialised. These qualitative assessments are less formally

developed in the Bank of England's stress testing programme and do not provide the basis for a financial institution to be publically failed (as have been Deutsche Bank, Santander and other institutions in the U.S.). But what the Bank of England call the 'qualitative review' describes essentially the same process. Among other things, it involves a supervisory examination of 'the degree of engagement by banks' Boards', the 'policies and procedures around model management', and 'controls around banks' stress-testing process' (Bank of England, 2015, p. 27).

Our argument is that when public and scholarly commentary focuses exclusively on the tests' quantitative results – the capital ratio figure in the adverse stress scenario – it is neglecting this equally significant aspect of the process. Indeed, our position echoes the sentiment of a former governor of the Federal Reserve, Daniel Tarullo, who complained that 'the importance of the qualitative component has been perhaps underappreciated' (Tarullo, 2016, para. 8). Methodological complementarities also motivate the emphasis. Since the effects of the qualitative assessment can only be perceived at the level of practitioner behaviour, analysis of the practice is particularly well suited to the kind of sociologically-informed approach to economic policy recommended by Lounsbury and Hirsh (2010). To be clear, by 'evaluate' we do not mean to suggest that we will provide a definitive assessment of the tests' efficaciousness, or draw firm conclusions about the relative importance of their quantitative and qualitative aspects. Rather, this paper aims to open up a qualitative stress test *empirically*; make sense of the procedure's significance *theoretically*; and deliberate *normatively* on the implications of our findings for scholarly debates about post-crisis regulatory reforms. In so doing, our analysis contributes to three scholarly literatures.

First, conceptualising qualitative stress testing requires setting aside the differences between two well-established fields of research – on the one hand, the social studies of finance (SSF), with its focus on economic theory and 'calculative agencies' (Callon, 1998; Callon and Muniesa, 2005; Callon et al., 2007); and on the other, cultural economy, with its focus on narratives, stories and rhetoric (Appadurai, 2011; Holmes, 2009; Langley, 2008; Pryke and Gay, 2007). For whereas the knowledge circuits examined by SSF have typically been private-private (trader-trader, economics-markets, etc.) and those of the cultural economy public-private (central bank expectation management, public discourse, etc.), regulatory stress testing combines elements of both. It is a *public-private-public communicative circuit* (a number of our interviewees described it as a 'loop') in which the quantitative measurement of a bank's capital in the stress scenario is intertwined with the

qualitative narrative account firms need to provide to regulators of their modelling and governance processes. We offer the notion of the *narrative imperative* to capture the *processual* nature of these interlocking *narrativisations*. The stress testing process begins when the regulator sets the scenario; it then passes to the banks who need to expand the scenario into a more detailed macroeconomic forecast and model the risks they face; the banks then return a written account to the regulator, justifying the assumptions underlying their simulation data and their governance actions. This study therefore answers a demand for more scholarship which sees calculation and narrativisation not as mutually exclusive logics but as two sides of the same coin (Muniesa et al., 2017).

Second, while the post-crisis policy literature on reforming risk culture identifies the importance of stress testing (BCBS, 2009; IIF, 2009), academic work has tended to just focus on the ethical and behavioural failures of practitioners (Chappe et al., 2012; Hill and Painter, 2015). The same emphases are found in official documents on what president of the New York Federal Reserve, William Dudley (2014, para. 1), calls the ‘culture problem’. Here, the ‘tone from the top’, accountability and executive compensation receive the most attention; the implications for risk modelling and governance, although mentioned, tend to be vague. When we employ the notion of ‘culture’ to understand the changes stress testing is bringing about we thus understand the term somewhat differently to both the policy literature and mainstream sociological scholarship (e.g. Swidler, 1986; Patterson, 2014). Inspired by the theory of ‘epistemic cultures’ (Knorr-Cetina, 1999) in science studies and research on how conflicting organizational ‘evaluation practices’ exacerbated losses during the financial crisis (MacKenzie, 2011; MacKenzie and Spears, 2014), by culture we mean the norms surrounding modelling and governance practices, with the notion of ‘epistemic subculture’ indicating the diversity of norms even within single financial institutions. Our finding that the stress tests are forcing banks to break down their knowledge ‘silos’ (Tett 2015b, xii) through more transparent modelling and organizational practices we therefore describe as a weakening of the boundaries between their intra-organizational epistemic subcultures.

Third, we argue that the pushback against the stress tests point to the limits of existing theorisations of narration and storytelling in economic life (Akerlof and Shiller, 2009; Shiller, 2017). The main reference point is Beckert’s (2013, 2016) theory of how uncertainty is managed through the formation of ‘fictional expectations’. For Beckert, fictional expectations are the ‘images actors form as they consider future states of the world, the way they visualise causal relations, and the ways they perceive

their actions influencing outcomes' (Beckert, 2016, p. 9). One of the most compelling examples is macroeconomic forecasting, which despite having a poor track record in predicting the future still serves as a discursive anchor for coordinating economic action (Evans, 1997). In many respects, regulatory stress testing is an even more perfect example. For while the producers and consumers of macroeconomic forecasts are aware of their fallibility, and hence 'fictional' properties, regulatory stress scenarios are quite explicitly hypothetical fictions (even if tethered to the criterion of 'plausibility'). Nevertheless, we argue that the backlash against the stress tests points to the limits of Beckert's theorisation of how narratives 'become the object of interest struggles among actors in economic fields' (Beckert, 2016, p. 11). Although such struggles are indeed taking place, the problem with Beckert's framing of the 'politics of expectations' is that it is insufficiently attuned to the *epistemic politics* of scenario crafting. In their lobbying against the regulatory stress tests private actors are not only seeking to 'influence' expectations, but to question fundamentally public authorities' cognitive authority to narrate the future. Similar to contemporary populist movements that reject the knowledge of 'elites' and 'experts', the pushback against the stress tests pivots on undermining the value of regulators' stress scenarios when they fail to predict socio-economic developments. We show that although these arguments misrepresent the purpose of the tests, they derive superficial credibility from the problematic lack of public knowledge about what regulators are seeking to achieve.

Research methodology

The study began as an exploration into how the scenarios of the regulatory stress tests are designed via immersion into the epistemic culture in which it is embedded. Stress testing is today a relatively well-defined field of financial risk management and so we were able to attend four specialist industry conferences on the subject in the City of London, including presentations by representatives of firms and regulators. The presentations included both highly technical papers as well as reflections on the direction of travel in the regulatory domain. The conferences also yielded connections for conducting semi-structured in-depth interviews with both public and private stakeholders in the Bank of England's stress tests in the UK. Thirteen individual and group interviews were conducted over a seven-month period (16 interviewees in total) and led us to gradually focus the research on the narrative aspects of the stress tests.

Supervisory stress testing is a highly elaborate form of what socio-legal scholars call 'joint' or 'meta' regulation (Gilad, 2010; Huault et al., 2012). While the extent to

which the banks themselves conduct the stress test varies across jurisdictions, in the Bank of England's test the banks themselves play a large role in the process (IMF, 2016) with the regulator only adjusting the results and undertaking 'quality assurance' ('marking the homework' as one interviewee put it). To understand the narrative circuit therefore required us to speak to a diverse group of actors involved with different stages of the process. On the public side we spoke with regulators involved in scenario design and with a connection to the supervisory aspects of stress testing. On the private side we spoke with stress testing managers at major global banks, compliance officers, 'quants' implementing the tests and financial technologists.

Elite interviews are notoriously prone to bias (Kincaid and Bright, 1957), and there are well-documented challenges to the investigation of regulatory compliance (Parker and Nielsen, 2009). Both regulators and firms have an interest in painting a positive picture of the efficaciousness of the tests and the robustness of the compliance responses. While sensitive to this problem, our concern was mitigated by the fact that when we spoke to an ex-regulator and two former stress testing managers their reports corroborated what we had heard from interviewees still in position. Perhaps the greater problem is self-selection. We contacted a much larger number of people than those who agreed to an interview, and so there is a possibility that we only spoke to those firms who were proud of their accomplishments and had implemented rigorously the tests. A final limitation of this study is that we were not allowed to cite the confidential, qualitative narrative reports submitted by the regulated banks to the Bank of England. It should also be noted that this article was read by the key regulatory bodies we spoke to for the detection of policy and technical errata.

Narrating doomsday scenarios

At the heart of stress testing is the scenario – an envisaged 'sequence or development of events' used to 'evaluate and map various outcomes of a particular situation' (Hassani, 2016, p. 1). A stress test begins by posing an overarching question: What if the property market crashed? What if there was a major sovereign default? What if the economy slips into a severe depression? The use of the imaginative faculty, however, has always left the method open to accusations of arbitrariness (particularly in contrast to methods based exclusively on market prices). Prior to the crisis this encouraged a preference for backward-looking stress scenarios drawing on well-documented historical events. For example, when stress testing was used in the construction of

mortgage-backed securities from the 1980s onwards, the macroeconomic variables associated with the Great Depression were adopted (MacKenzie, 2011).

When stress testing entered into banking, after being encouraged under Basel I and mandated under the Basel II regulations, it played second fiddle to the statistical 'Value-at-Risk' (VaR) method used for calculating market risk and the advanced internal-ratings-based (A-IRB) approach for credit risk. Supervisors were meant to monitor banks' internal stress tests, but with the results not leading to any mandatory actions they tended to be neglected. The Basel Committee criticise the fact that prior to the crisis banks' scenarios 'tended to reflect mild shocks, assume shorter durations and underestimate the correlations between positions' (BCBS, 2009, p. 10). Or, as a former risk manager at a large UK bank recalls more vividly:

It was a bit of a joke... I know one institution... that kept amongst their stress test, US invades Iraq seven or eight years after the Iraqi invasion has taken place... I'm not aware of any regulated institution who conducted a serious stress-testing programme pre-crisis. (Interview 13 September 2016)

That would all change with the onset of the financial crisis in 2007. When banks' internal models started to break down, recording statistically anomalous numbers of 'exceptions', the solvency of financial institutions was thrown into doubt. Stress testing emerged as the solution for assessing more accurately the state of banks' balance sheets. Yet given the deficiencies of banks' own stress testing exercises, it would not be sufficient to take these 'off-the-shelf'. Led by the U.S. Federal Reserve, regulators made two main innovations. First, the stress scenario was set by the regulator and was applied uniformly across all firms subject to the test. This allowed the results to be commensurated for comparative purposes, and, theoretically at least, to permit macroprudential modelling of the financial system as a *whole*.² Second, unlike most of the pre-crisis tests carried out by banks, the scenarios were future-oriented and framed as exercises probing into 'tail risks' looming on the horizon. Taking inspiration from the Nassim Taleb's (2008) philosophy of the 'black swan', such scenarios would attempt to capture 'severe but plausible', 'low probability high-impact events' by pushing forward into the grey zone between risk and uncertainty (Rebonato, 2010).

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² Post-crisis regulatory stress tests are used for both *macroprudential* oversight of systemic risk across the banking sector as well as the *microprudential* supervision of individual banks. In this article we only address only the latter. However, it should be noted that the line between the micro- and macro-prudential regulation is indistinct, and that is also true with respect to stress testing

A regulatory stress scenario takes the form of a spreadsheet of macroeconomic 'variable paths' projected over a future time horizon. In the Federal Reserve's 2011 CCAR, for instance, this included 9 common macroeconomic variables projected over two years: real GDP, Consumer Price Index (CPI), real disposable personal income, unemployment rate, three-month Treasury bill rate, 10-year Treasury bond rate, BBB corporate rate, Dow Jones Index and National House Price Index. The list of variables would grow in successive iterations of the CCAR (Goldstein, 2017, p. 88) and be expanded greatly in the Bank of England's public stress tests. These variables would also be supplemented with an increasingly elaborate narrative to provide the background story which ties them together. For example, in the 'high-level narrative' of the 2014 Bank of England scenario, which seeks to explore vulnerabilities related to the mortgage market, the story begins:

Output growth in the United Kingdom starts to disappoint relative to expectations. In part, this is driven by continued weakness in productivity. Perceptions of a permanent productivity shock raise concerns over the sustainability of internal and external debt positions. This leads to a rapid re-assessment of the prospects for the UK economy.
(Bank of England, 2014, p. 5)

Some of the benefit of the narrative accrues to the public authorities designing the scenario. As a UK regulator told us: 'having a narrative is always really important... it actually really helped us design the framework, because I think the most important thing when you're designing stress tests is thinking about [...what] could cause this kind of scenario to occur' (Interview 23 August 2016). The narrative also serves to open up the stress testing process to a wider set of stakeholders. With some regulators lacking a background in economics, the written narrative enables them to 'join the conversation' (Interview 23 August 2016). The challenge, given these group dynamics, is to devise a non-arbitrary scenario. A former Bank of England regulator conceded that 'one of the weaknesses.... is the arbitrariness of the scenarios, really. I sat on a scenario committee and had people saying: let's move that rate a point. [It] probably needs a bit more analysis than that' (Interview 22 November 2016). The narrative is supposed to help militate against such tinkering by allowing stakeholders to ask if the scenario is: 'something we actually think is likely? Is it the right thing to be looking at?' (Interview 14 December 2016).

However, the scenario's narrative serves not just to assist in its design but also to initiate the stress testing circuit on the banks' side. A European regulator noted that 'you can't communicate the scenario if it's just a bunch of tables' (Interview 5 December 2016). This comment refers to the fact that once the macroeconomic

variables associated with regulatory scenario are published they then need to be expanded ('propagated' in the jargon) by the firms themselves into a wider set of variables. Part of the reason why the regulator does not supply an exhaustive list of variables is logistical: they do not have the resources to produce a complete economic forecast in the scenario. Partly it is by design, since it makes firms 'demonstrate that they understand the method; that they are thinking of the scenario' (Interview 23 August 2016). The scenario narrative helps firms expand upon these variables in a way consistent with the risks they face and the geographical diversity of the markets they invest in. A stress testing economist at a large financial firm described the process as: 'kind of filling in the blanks... let's say there are some 20 numbers [provided by the regulator]... we can extend that to up to some 100 variables' (Interview 14 June 2016).

The narrative imperative has also left its mark on banks' modelling practices – leading to an intertwining of the tests' quantitative and qualitative aspects. The models chosen for undertaking the scenario expansion are shaped by the need for intelligibility, communicability, and consistency with the scenario narrative. Not without a certain irony, the Dynamic Stochastic General Equilibrium (DSGE) models used by central banks in macroeconomic forecasting fare poorly against such criteria since they are 'often behaving as a black box... and it's very hard to explain that to a regulator' (Interview 14 June 2016). Similarly, the standard econometric model used to link together historical time-series – vector autoregression – is poor from a communication perspective since 'the economic intuition is not there. You cannot link them to particular narrative that easily' (Interview 14 June 2016). The choice of one firm to adopt a 'linear sequential' approach, based on 'core' and 'satellite' models, was motivated by the need for senior management and regulators to be able to understand the drivers of the expanded scenario. As our interviewee put it: 'essentially you have to be able to tell a story. And this affected the way we model things' (Interview 14 June 2016). The result has been a newly pluralistic and pragmatic approach to scenario modelling. A stress testing economist we spoke to reflected on the significance of the changes in modelling practices that have been brought about the need for an intelligible and defensible alignment between the scenario narrative and its macroeconomic expansion:

I think in the economics profession, in academia, there's this notion of, you know, there may be something like one best model. I think we're moving a little bit away from that, sort of philosophically speaking... The regulators don't necessarily want some sort of the art modelling, but they want a clear, transparent process... So the idea is to have a clear link between the narrative and the forecast through the model... You know, it was

much looser five to seven years ago. Right now the connection is more straightforward and we got better at it; we are forced to by the regulator. (Interview 14 June 2016)

The narrative not only helps firms to expand the regulatory scenario; the need to also produce a governance narrative that justifies firms' calculative decisions has also shaped the evolution of modelling practices. In the conferences we attended, this narrative imperative was a persistent theme. Presenters repeated that state of the art modelling or data analytics would be insufficient for satisfying the requirements of a regulatory stress test, since the main criterion for model choice should be the communicability of its results both within the financial organisation and to the regulators. As a former stress testing manager at a UK bank surmises, the result is that the testing process is 'shining more of a light on the models, from the non-modellers' since in the past 'the quants could potentially get away with some deficiencies and no one would really challenge [them]' (Interview 22 November 2016).

The final stage of the modelling process involves translating the expanded set of macroeconomic variable paths into a set of models for evaluating credit and market risk and arriving at profit and loss estimates (the 'macro to micro model'). Here, the narrative imperative plays a lesser role, as the narrative is already embedded in a firm's expansion of the macroeconomic variables supplied by the regulator. The key challenge is to take these variables and translate them into risk projections across a bank's portfolio of investments. For instance, modelling the credit risk of mortgage lending might entail a form of statistical regression where historical correlations between macroeconomic variables and mortgage defaults are identified and these are then mapped onto the macroeconomic variable paths in the regulatory stress scenario. Like every other decision made by banks in the stress test, the choices and assumptions underlying the model need to be recorded and justified in the qualitative narrative supplied to regulators. But none of our interviewees told us that this affected directly their choice of risk models. That contrasts with the governance aspects of the stress tests. The next section shows that the narrative banks need to produce about how they managed the stress test can change their governance cultures and may even lead to organisational restructuring.

Governing uncertainty: silo-busting as cultural reform

At the height of the financial crisis, a report on the risk management practices of banks was compiled by the Senior Supervisors Group (a transnational forum involving key American and European regulatory agencies). The report concluded that the firms who

suffered the biggest losses did not have a ‘comprehensive approach to viewing firm-wide exposures and risk’ and lacked ‘effective dialogue across the management team’ (SSG, 2008, n.p.). In a more populist vein, this would also be the crux of Tett’s (2015b) critique of the ‘silo effect’ in which organisational complexity and rigid classification systems can leave organizations ‘blind to risks’. The silo-based explanation for the crisis can seem unsatisfying, as it seems to absolve individuals of guilt by emphasising the structural-organisational determinants of the problem. That it is not just a managerialist apology for poor governance and fraudulent behaviour is shown by MacKenzie (2011) who provides a detailed case study of how the separate modelling cultures involved in the creation of mortgage-backed securities and collateralised debt obligations led to risks being overlooked and losses being amplified during the financial crisis. This section shows that regulators’ desire to break down these silos through qualitative stress testing centres on the requirement placed on firms to maintain a consistent thread between the scenario and governance narrative.

Regulators’ ambition to have firms down organisational barriers and introduce more expert judgement arrived practically fully-formed in the Federal Reserve’s first 2011 CCAR, with its ‘capital plan’ qualitative assessment. In the case of the European Banking Authority’s stress tests and the Bank of England’s stress testing programme the introduction of these qualitative assessments was a more incremental process. The first, poorly received and widely criticised (Langley, 2013; Vestergaard and Retana, 2013; Goldstein, 2017, chap. 1), 2011 European Banking Authority stress test was an almost entirely quantitative exercise. There was also much less emphasis on the qualitative aspects in the Bank of England’s stress tests before they went public in 2014. A stress testing manager at a large UK bank recalled that in the past there was: ‘a lot less people involved [in the governance of the stress tests]... a lot less oversight of it. It felt almost as if it was done on the side of a desk’ (Interview 22 November 2016). The increasingly qualitative nature of the exercise over the intervening years was expressed in the shift away from making a simple spreadsheet submission of the results towards the inclusion of a detailed set of Word documents outlining their governance narrative. The same interviewee recalled that their submission in response to the 2011 European stress test included a ‘spreadsheet... and where there were narrative Word documents, nothing fancy.’ By the 2014 Bank of England test, in contrast, ‘[the regulator] got 50 megabytes of Word documents’. This was ‘just literally a narrative. So something that says, these are the results; main drivers are XYZ; we’ve assumed this... so it’s just trying it put the words around what the results are showing and why’ (Interview 22 November 2016).

The main governance function that firms need to narrativise is their 'review and challenge' process. In recognition that prior to the crisis many banks had poor controls in place for monitoring their hundreds of models, dispersed across their numerous divisions, the qualitative stress test asks for evidence that the assumptions underlying these models are being interrogated critically. In respect to the scenario expansion, in one bank this prompted a series of 'very intense meetings' requiring 'laying out the various choices that are being made, and justifying them and asking for comment' (Interview 23 August 2016). The review and challenge process also requires evidence of the involvement of senior management. In some firms, this led to the establishment of high-level stress test committees, which proved unexpectedly successful in drawing in people from across the organization.

Every single one we had, everyone turned up. And then it was standing room only – committees don't usually have that sort of attraction... And it prompted discussions that clearly weren't happening anywhere else. So it created some interesting dynamics in terms of how areas interacted... And it's surprising that stress testing does that, and that some connections or dependencies or risks aren't necessarily identified until you do that.' (Interview 22 November 2016)

These experiences were repeated at another UK bank. Our interviewees reported that the review and challenge process – and the requirement to both submit the minutes of the meeting and narrativise the results in their stress test submission – had effects that went beyond providing a functional, 'tick-box' compliance response:

...something you might not appreciate sitting outside a bank is the – is also the catalytic effect it [stress testing] can have internally... so we really need think of just forcing people to connect the dots and join the dots inside a bank. That's why I was talking about silo-based management; stress-testing just cuts across all that. (Interview 23 August 2016)

As the financial crisis made clear, silos proliferated across the large and sprawling banking organisations that had emerged out of mergers over the previous decade. There is therefore no single 'silo' that the regulatory stress could be said to be opening up. However, one set of silos that the stress tests particularly problematizes is the division between finance and risk departments. Practitioners in a bank would traditionally report their profit and loss to finance, and the risk department would conduct separately the risk assessment of the positions being taken; there was little or no attempt to consolidate these 'separate worlds' (Interview 22 November 2016). The extent to which the stress tests have actually encouraged firms to restructure their organisations to open up these silos, and weaken the boundaries between their

epistemic subcultures, depends on the depth of the tests' integration into business activities. A former regulator we spoke to characterised the banking sector as having split into 'two camps' in response to the tests, where 'there's one half who are going, yeah, let's do it: let's tear up all systems and join them all together properly. And there's the other half who are in denial, who are kind of sticking plasters on it' (Interview 22 November 2016).

As the stress tests have proven largely successful in driving up bank capitalization, addressing these persistent organizational and governance deficiencies has become the driving force of the stress testing programmes. For instance, in the 2016 Bank of England stress test only one bank (Royal Bank of Scotland) failed the quantitative aspect of the test, but the report into the tests' findings recorded that it was 'disappointed that the rate of improvement has been slower and more uneven than expected' (Bank of England, 2016, p. 11). Partly for this reason, the Bank's new biennial 'exploratory' scenario, which began in 2017, moves away from a focus on capital adequacy and requires significantly less detailed data submissions from firms. Instead, the scenario focuses on potential 'headwinds' to bank profitability and the challenge it poses to their traditional business models (Bank of England, 2017, pp. 7–8). The time horizon of the scenario stretches to seven years and the emphasis is firmly on making banks demonstrate their ability to thinking imaginatively over the medium term. Similar, albeit probably opportunistic, changes are taking place in the European Banking Authority's tests, which in 2016 dropped the 'hurdle rate' (the minimum capital ratio which determines whether a bank is awarded a pass or fail judgement). A European regulator defended the decision on the grounds that 'we don't want to just provide a clean bill of health for banks and say these banks are fine nothing can happen to them because that's nothing we can provide with the stress test' (Interview 5 December 2016). The results will instead feed into the European Central Bank's Supervisory Review and Evaluation Process (SREP), with an emphasis on the assessment of banks' governance processes which appears to 'resemble the "qualitative" part of the [Fed's] CCAR test' (Goldstein, 2017, p. 98).

Arguably, this newly explicit emphasis on the qualitative aspects of the tests has been implicit for some time. That is particularly the case from the perspective of bank supervisors who want to see that information flows more freely within banks and whose primary aim is to establish a shared knowledge base between regulators and financial firms. A UK regulator praised the stress tests on the basis that they

create a lot of information for the banks themselves and for their supervisors... for the board to understand the risks that a bank is running; for the supervisors to understand

how the banks are responding to those risks; for everyone to have a shared knowledge base of quite extreme scenarios. (Interview 14 December 2016)

Another interviewee noted that this knowledge work takes precedence over quantitative aspects of the test. 'None of the supervisors care that much about the headline number that comes out of the exercise. It's getting the firms to do the analysis, which is interesting' (Interview 22 November 2016). Other firms we spoke to agreed. A stress testing economist described the testing process as primarily 'a tool to investigate and communicate risks in a bank' (Interview 23 August 2016). A former stress testing manager emphasised that the benefits of the test do not lie with the quantitative results but rather the qualitative interrogation of where the results come from:

...people are actually challenging: do we understand these outputs? And whether something is 10 or 20, it doesn't really matter. And actually you know it's wrong... the one thing about stress testing and forecasting, the answer is wrong. It won't ever be that. But what it does tell you is the direction where things move, how things are interacting, where risk may come about. And that's the important bit. That's what stress testing should be for. (Interview 22 November 2016)

In sum, there is evidence to suggest that stress tests' narrative imperative is proving an important driver of reformed modelling and governance practices. Our study thus supports the findings of the U.S. Government Accountability Office's (GAO's) report into the Federal Reserve's CCAR programme which credits the stress tests with reducing fragmentation across business units and inculcating a stronger focus on governance (GAO, 2016, p. 28). However, the GAO do not link these improvements to role played by narrativisation in qualitative stress testing, and nor does it associate these changes with cultural reform. This study brings these elements together to see how the task of conjoining the scenario and governance narrative is crucial for encouraging reformed cultural practices. By the same token, the findings also take us away from the conventional view of stress testing as a procedure focused solely on measuring banks' capital adequacy. The head of stress testing at a large UK bank reflected on the stress testing process in a way which would be familiar to readers of Beckert's (2013, 2016) work on 'fictional expectations'.

Part of, in all of this, is that stress testing is... part science, part art, part voodoo... as well as using all the science and economic theory at our disposal to help do it, we're also telling a story. So at some level we're story tellers. You know, we talk specifically about the narrative around the stress test. What is the story about? What does it mean? ... We're also partly narrating a fiction, but I hope a powerful and meaningful fiction. (Interview 23 August 2016)

And yet, such narratives are not without detractors. Objections to the stress tests question the cognitive authority of regulatory to design stress scenarios, capitalising on long-standing unease with the arbitrariness of the practice. The next section demonstrates the significance of our findings by showing how the pushback against the tests rests on a naïve predictive understanding of their purposes. In turn, this will point to the limits of Beckert's existing theorisation of the 'politics of expectations' and foreground the politics of scholarly evaluations of post-crisis regulation.

Contesting regulators' cognitive authority

Since the crisis, major financial institutions have mostly acquiesced to the raft of new regulations placed on their industry from the U.S.' Dodd-Frank Act onwards. The ebb and flow of lobbying activities has of course continued unabated (Pagliari and Young, 2016), but there were few attempts to challenge directly the authority of regulators. Yet the winds are shifting. Even before the election of U.S. President Donald Trump on a platform which promised to roll back post-crisis regulations, a critical literature on the regulatory stress tests emerged in both the UK and US. The arguments mobilised in these critiques are not directly comparable, as a large focus of the U.S. literature is on the 'black box' internal models utilised by the Federal Reserve to derive their quantitative results (The Clearing House, 2017). This criticism does not apply in the case of the Bank of England's stress tests, since although the results are adjusted based on the Bank's own models the regulated firms themselves play a larger role in deriving the results (IMF, 2016). However, some critiques cut across the regimes. This section will argue that these critiques need to be conceptualised as having an *epistemic politics* in which the authority and knowledge of public actors to determine narratives is at stake.

The most vulgar criticism of regulatory stress testing points to the failure of regulators to predict economic developments when designing scenarios. The Committee on Capital Markets Regulation, an independent research organization representing financial sector interests, devote a section of their report on the Federal Reserve's CCAR stress testing programme to cataloguing the instances where the Fed's assumption have 'vastly differed from reality' (CCMR, 2016, p. 6). Similarly, the fact that the 2016 test did not 'explicitly assume a decision by the United Kingdom to leave the European Union' (CCMR, 2016, p. 7) is used to cast doubt on the test's integrity. In the UK, the most vocal critic of the Bank of England's stress testing programme is the financial economist, Kevin Dowd. Writing for the free-market think

tank, The Adam Smith Institute, Dowd criticises the reliance on a single regulatory scenario since it provides no guidance about 'a large range of other plausible adverse scenarios' (Dowd, 2015b, p. 37). Dowd also notes that according to the Bank of England's own macroeconomic forecasts the stress scenarios are unlikely to transpire. For good measure, he then criticises the poor track record of forecasting by the Bank's Monetary Policy Committee. Representing the purpose of stress tests as being to simply 'reassure the public that the banking system is sound' (Dowd, 2015a, p. 507), this allows him to conclude that they are 'worse than useless' since they provide false comfort.

As already shown, these arguments capitalise on a long-standing unease with employment of the imaginative faculty in regulatory stress testing. But as also seen, they misconstrue their purposes. Regulatory scenarios do not aim to predict the future; their goal is to increase preparedness for adverse conditions which *cannot* be predicted. That is what Langley means when he describes the ascendance of stress testing as a 'subtle but significant technique change in the techniques of financial risk management', reflecting a wider tendency 'to govern by uncertainty and not by probabilistic risk' (Langley, 2013, pp. 54–55). Particularly from the perspective of the qualitative assessment, which critics tend to ignore, the regulatory scenario serves as a communicative device to foster shared knowledge between public and private actors. Banks are already compelled to design and run their own internal scenarios to test for risks idiosyncratic to their institutions; the regulatory scenario remains important since it provides a common knowledge base between banks and their supervisors.

If criticisms of stress testing centred on their predictive failures misrepresent their purposes, they still problematize existing literature on economic narratives. Such work points out that narratives confound putative objective understandings of economic dynamics and instils 'confidence in conditions of uncertainty' by permitting a 'fictitious certainty contributing to decision-making' (Beckert, 2016, p. 242). Beckert does write that a 'politics of expectations' is inevitable given that 'the number of possible scenarios to be imagined is infinite'. He does not, however, take this insight further than observing that this leads 'actors to have an interest in influencing other actors' expectations' (Beckert 2016, p. 275). It is the idea of 'influence' which is insufficient to capture the political dynamics at work here. In pointing to failures of prediction and the limited set of regulatory stress test scenarios, the arguments employed to push back against the stress tests do not simply seek to 'influence' expectations but rather call into question the cognitive authority of regulators to design stress scenarios. That such critiques can derive even superficial credibility points to a

well-documented problem with the development of post-crisis regulation at the elite technocratic level (Baker, 2013). There has been little to no public or democratic involvement in these regulatory innovations, which leave them vulnerable to shifting political winds. It is of course unsurprising that the public has not shown great interest in these complex socio-technical-legal procedures; more troubling is that there is also little appreciation for them even amongst scholars of financial regulation. For instance, in her critique of post-crisis capital regulation, Admati cites Dowd's argument about the supposed flaws of the Bank of England's stress tests to write off the practice as mere window dressing for the failure to vastly increase bank capitalization (Admati, 2016). That Dowd is coming from a strongly anti-regulatory perspective – ultimately seeking to unwind financial regulation in its entirety – and Admati is pushing for a radical regulatory reform, does not impede the mutually-reinforcing nature of their critiques.

The epistemic politics of stress testing is therefore not just a challenge to the cognitive authority of regulatory bodies but also inextricable from public knowledge of what regulators are seeking to achieve. While the influence of social scientists on the public debate should not be overstated, neither can they be absolved of responsibility for increasing their knowledge of the practices they criticise when intervening into such debates. We believe that if were they to do so it would lead to a more balanced evaluative approach; one able to recognise both the achievements and limitations of the post-crisis regulations. Such a shift in approach would also heighten scholars' sensitivity to how certain evaluative positions, even if taken in good faith, might unwittingly play into the hands of powerful vested interests.

Conclusion

The shock of the 2007-9 financial crisis inevitably gave rise to much speculation about the end of the capitalism, neoliberalism and free market economic ideas. That such changes did not come to pass has given rise to an entire literature devoted to seeking to explain why (Crouch, 2011). The expectations of scholars who envisaged transformative reforms in the financial sector have followed a similar trajectory. Disillusionment with post-crisis regulation has encouraged a representation of the reform agenda as putting little more than a superficial sticking plaster on deep structural problems. Even those authors more sympathetic to the knowledge problems facing regulators have come to sobering conclusions about the 'inherent limits' of financial regulation (Stellinga and Mügge, 2017, p. 23).

This article does not contest these critiques but argues that an exclusive focus on the limits of post-crisis regulations risks missing the benefits of regulators' new future-oriented technologies and procedures which are enabling them to augment their knowledge and bring about changes in the governance of financial institutions. The case in point is qualitative stress testing – an important but frequently overlooked counterpart to the capital ratios projections produced in quantitative stress testing. To demonstrate the significance of the practice, we showed that the *narrative imperative* which traverses the qualitative assessment is shaping modelling and organisational practices within banks to increase their transparency, intelligibility and communicability. Our findings suggest that these changes are beneficial for both the internal governance of banks and their supervision. However, we also observed that the arguments employed by critics to pushback against the stress tests contest regulators' cognitive authority to design stress test scenarios. These actors' representation of the tests as failed exercises in prediction, and the recommendation that scenario design be returned exclusively to banks themselves, would sever the public-private-public communicative circuit this article was devoted to explaining. This led us to observe that the epistemic politics of the pushback against regulatory stress testing is inextricable from the lack of public knowledge and engagement with post-crisis regulation. That is what Beckert's theorisation of the 'politics of expectations' is currently unable to account for. Private actors seek not only to 'influence' expectations but also target the cognitive authority of public authorities by capitalising on the knowledge gap. Yet the lack of public knowledge about post-crisis regulatory reforms is not an immutable epistemic horizon, but a problem that scholars can themselves contribute toward remedying. This article will have succeeded if it contributes in some small way towards that goal.

Beyond its intervention into debates on post-crisis financial regulation, this study's main contribution is to understanding the use of narratives in economic life. So far work on narratives has focused almost exclusively on the public domain with, for example, studies about how central banks use them to promote behaviour conducive to their policy goals (Braun, 2016). These are valuable contributions to the field. But it is necessary to expand this literature so that it recognises how narratives are not restricted to the public domain and also play a large role *within and between organisations*. Although an under-explored research focus, a relevant practice that has been examined is the impact case study in the U.K.'s Research Excellence Framework (REF). Watermeyer and Hedgecoe (2016) find that for the assessors of impact case studies criteria such as 'narrative lyricism' play an important role in how favourably they judge the impact of scholars' research. Yet, their observations do not tell us how

the requirement placed on scholars to craft such narratives might affect the nature of academic work itself. The public-private-public communicative circuit examined in this article provides an example of where an inter-institutional narrative imperative seems to have promoted beneficial reforms in line with policy objectives. But there may be examples of narrativisation processes, such as the REF impact case study, which are less efficacious – either bureaucratising activities better left alone or failing to leave a substantial impact on what is being narrated.

Another important contribution of this study is to show that it is possible to move beyond the dichotomy between calculative devices and narratives. We have shown that narratives in the regulatory domain are not simply a gloss placed upon the quantitative basis of financial risk management. The need to narrate and communicate what models are doing can shape the choices of models and the assumptions feeding into them. This is surely just one practice in a wider field of calculative and narrative enmeshments. Scholars willing to take an ecumenical approach, operating at the intersection of the social studies of finance, cultural economy and political economy, are well placed to evaluate their significance and how they speak to the pressing issues of our time.

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