

Regulatory responses to risks from financial innovation following the GFC: Evidence from the G20

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Abstract:

This paper explores how G20 countries are interpreting and implementing a Financial Stability Board (FSB) recommendation aimed at mitigating the risks from financial innovation. We do so through a formal content of the FSB's *Implementation Monitoring Network Surveys* of 2010 to 2012. Our results suggest that G20 countries have displayed large interpretive differences and little forward planning in tackling the recommendation. For instance, though the recommendation emphasized enhanced firm and regulatory capabilities, 90% of the measures implemented or proposed dealt with regulatory capabilities and only 10% with firm capabilities. Further, most implemented measures (additional/new recruitment, training, guidelines) were easier to implement relative to more challenging measures (new laws/acts, regulators, committees). Our analysis suggests countries' responses to the FSB recommendation were moderated by past experience with financial crises (number and nature of past crises), the type of financial/legal system they have, and by their regulatory structures (how concentrated their regulatory institutions are and the degree of central bank influence). Overall, our results suggest that G20 states have found it difficult to interpret and address the recommendation in a comprehensive and thematic manner. This has ultimately led to the recommendation being given a low priority. This should be of concern to policymakers and regulators given the central role many have mooted financial innovation played in the Global Financial Crisis (GFC).

Keywords: Financial innovation, financial regulation, Global Financial Crisis, G20, Financial Stability Board

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1. Introduction

Financial innovation is high on policymakers', regulators' and academics' agendas (for instance Allen, 2012; Gennaioli, *et al.* 2012; Lerner and Tuffano, 2011; Shiller, 2013; Thakor, 2012). This renewed interest in financial innovation stems from the central role that financial innovations such as Collateralized Debt Obligations (CDO) and Credit Default Swaps (CDS) are mooted to have played in the most severe financial and economic crisis since the Great Depression (Allen, 2012; Brunnermeier, 2009; Mason, 2008). In response to the Global Financial Crisis (GFC), the 2009 G20 government meeting in London established Financial Stability Board (FSB) in order to address vulnerabilities of the financial system and “*to develop and promote the implementation of effective regulatory, supervisory and other financial sector policies*”¹. In order for it to do so the, FSB is charged with monitoring the implementation of a host of G20 recommendations agreed principally at the G20 summits in London (2009), Pittsburgh (2009), Toronto (2010), Seoul (2010) and Cannes (2011).²

This paper explores one of these recommendations - one that relates to the mitigation of risks from financial innovation, namely;

“Supervisors should see that they have the requisite resources and expertise to oversee the risks associated with financial innovation and to ensure that firms they supervise have the capacity to understand and manage the risks.”(FSF 2008, p.40)

In the context of this recommendation, this paper addresses the following question: How are different G20 countries interpreting and implementing the FSB/FSF recommendation related to risks associated with financial innovation? In order to address this question we conduct content analysis on G20 countries' progress on reforms related to risk from financial innovation as reported in the annual *FSB Implementation Monitoring Network Surveys*.

From this assessment, progress towards achieving the aims of the recommendation may be mapped, providing insight in to how countries are responding to the challenges posed by financial innovations. The content analysis recognises that the recommendation has two components. The first relates to how G20 member countries have gone about ensuring their financial regulators have ‘*the requisite resources and expertise to oversee the risks associated with financial innovation*’ (FSF 2008, p.40). The second component explores how ‘supervisors’ have ensured that companies and their employees are able to understand and manage the risks associated with financial innovation.

Thus we illuminate the degree to which the G20/FSB recommendations are changing legislation and regulatory practices. Moreover, the research highlights jurisdictional differences in implementation of the recommendation across the G20, in terms of new regulatory capabilities and new legislation and rules that might impact firm level risk management. Further, we explore whether countries' responses to the FSB

¹ See Diaz-Rainey and Ibikunle (2012, p. 52) and <http://www.financialstabilityboard.org/about/overview.htm> [cited 18/9/2013]

² http://www.financialstabilityboard.org/activities/implementation_monitoring/index.htm [cited 18/9/2013]

recommendation are moderated by past experience with financial crises (number and nature of past crises), the type of financial/legal system they have, and by their regulatory structures (how concentrated their regulatory institutions are and the degree of central bank influence).

Although grounded on the growing body of literature exploring the ‘dark side’ of financial innovation (for instance Henderson and Pearson, 2011), the paper does not intend to pass judgment on individual innovations or to malign financial innovation more generally. Indeed, it is clear that financial innovation is not *per se* the culprit; rather it is often its unscrupulous use or the unintended consequences of financial innovations which can contribute to financial problems (Diaz-Rainey and Ibikunle, 2012; Van Horne, 1985). This noted, however, it is evident that as a political grouping meeting at the height of the financial crisis, the G20 believed financial innovation posed serious threats to financial stability and that new firm and regulator capabilities were required to address these risks. Our concern here is to ascertain how G20 member countries interpreted and acted as a result of this FSB recommendation on financial innovation. We do so as follows: the next section reviews relevant bodies of knowledge on financial innovation and financial regulation, Section 3 outlines research design, Section 4 provides the results of the formal content analysis, while Section 5 provides concluding remarks.

2. Literature Review

This section will review three broad strands of literature related to the examination of regulatory responses to risks from financial innovations. First, we examine the literature on financial innovation and its negative consequences; next, we place our work in the context of the literature on regulatory cycles; and finally, we explore how regulatory responses are governed by institutional factors such as path dependency and the nature of the financial system.

2.1. Financial innovation and its negative consequences

Allen and Yago (2010) define financial innovation as the creation and diffusion of new financial instruments, technologies, institutions, and markets. The early literature on financial innovation has taken a relatively benign view of the risks arising from financial innovations, arguing financial innovations arise to correct market inefficiencies, and that market forces would effectively regulate the risk-reward balance between transacting counterparties (Miller, 1986; Merton, 1995; Frame and White, 2004). In this worldview, financial innovations are tools that are applied to existing situations to facilitate the raising of capital, transfer of risk and to provide liquidity, leading to higher economic welfare. For example, Hendershott *et al.* (2011) cite High Frequency Trading as an example of a financial innovation that has led to the increase of liquidity and the decrease of trading frictions and market inefficiencies in financial markets.

However, the credit crunch of 2007-2008 and the Global Financial Crisis (GFC) has led to renewed academic interest in financial innovation (for instance Allen 2012; Gennaioli *et al.* 2012; Lerner and Tuffano 2011; Shiller 2013; Thakor 2012). Indeed, there is increased recognition that financial innovation can play an important role in creating risks within the global financial system (Allen 2012; Brunnermeier, 2009). Accordingly, Diaz-Rainey and Ibikunle (2012) review the growing body of literature

on the ‘dark side’ of financial innovation. For example, Henderson and Pearson (2011) analyse retail structured equity product and find that the average offering prices are almost 8% higher compared to the implied fair value as estimated by option pricing methods, and that the mean expected return estimate is slightly below zero. This supports their hypothesis that issuing firms may deliberately introduce innovative products to exploit uninformed investors (Bergstresser 2008, provides equivalent findings for a larger dataset of equity products from the US, Europe and Asia). From their review, Diaz-Rainey and Ibikunle (2012) present a three pronged taxonomy of the ‘dark side of financial innovation. They note that the negative consequences of financial innovation can take the form of either (1) *Predatory schemes* (2) *Abuse of financial innovation* and (3) *Unintended consequences of financial innovation*.

A number of interesting and relevant papers have been published since the Diaz-Rainey and Ibikunle (2012) review. Of these, three theoretical contributions stand out. First, Fostel and Geanakoplos (2012) show that the timing of financial innovations (in particular that of tranching and CDS’s) may have contributed to the GFC. Second, Gennaioli *et al.* (2012) develop a model of financial innovation where financial institutions engineering securities perceived to be safe but which are exposed to neglected risks. This outcome arises from two key assumptions: (1) that investors neglect risks deemed to be unlikely to occur; and (2) investors demand securities with safe cash flows. Finally, Thakor (2012) suggests that the consequences of exploiting uninformed investors is the possibility of systemic risks occurring when these uninformed investors subsequently become informed about the undesirability of the investments that they have been sold. Because of potential noise in their ability to discriminate between desirable and undesirable investments, these investors may decide to withdraw all of their capital from financial markets, which would then lead to a system-wide funding crisis.

On the empirical side, Kim *et al.* (2012) explore the effect of financial regulation and innovation on financial crises using macroeconomic and financial data for 132 countries. Their results suggest financial innovation increase the likelihood of banking crises but decreased the probability of currency crises. Finally, Lerner and Tuffano (2011) provide a review of the literature on financial innovation. In their review they advocate complementing existing theoretical and empirical approaches to the study of financial innovation with additional methods, especially case studies. Accordingly, our examination of the G20 countries response to the FSB recommendation on financial innovation using content analysis represent an original approach to examining the nexus between risk, regulator and financial innovation.

2.2 The Regulatory Cycle

Prior work on the interaction between regulators and regulated parties suggest a dynamic relationship. On one hand, these institutions are expressly set up for the purpose of regulating industries in the interest of the public. Bernstein (1955) observes that independent commissions, when first set up, tend to pursue the public interest in an aggressive manner. On the other hand, Stigler (1971) develops the idea of regulatory capture, where public interest regulatory institutions are influenced and dominated by the industries that they are charged with regulating, which eventually results in those institutions acting in ways that benefiting those industries instead of

protecting the public interest. Similarly, Laffont and Tirole (1991) develop an analytical model that draws upon insights from agency theory to show that it is in the best interest of an regulated industry to pay (capture) the regulatory institution (the agent), so that the institution does not provide accurate information to lawmakers (the principal) that could allow lawmakers to weaken that industry's ability to generate excess rents. Leiserson (1946) documents another set of forces which can weaken the aggressiveness of regulatory institutions. Firstly, they lose the co-operation of the industry that they are regulating, which weakens the ability to discover potential risks. Secondly, they may lose public and political support due to the concerted lobbying efforts of that industry, which may eventually lead to their shutdown.

Martimort (1999) draws upon these studies to formulate an analytical model of the life cycle of regulators. He proposes that regulatory capture arises from a self-enforcing exchange of favours, over time, between regulators and the industry that they regulate. That is to say, regulators are initially not captured, but are gradually captured over time by the industry that they regulate. Hence, the life-cycle of regulators is such that they start out un-captured, and are slowly captured by the industry that they regulate, until they are rendered ineffective by their capture.

2.3 Financial institutions and financial regulation

In this section we explore how financial institutions and financial history interact with financial regulation. In particular, we focus on the nature of the financial system distinction between (market based vs. bank based) financial systems, and on the concept of regulatory structure and how this is impacted by path tendency.

Nature of the financial systems: market-based vs. bank-based

Levine (2002) provides a good review of existing literature that classifies countries into two groups according to their financial structure: countries that employ a bank-based system, and countries that employ a market-based system. Bank-based systems places banks at the nexus of financing, with firms raising capital directly from banks in exchange for increased governance and monitoring by those banks. In market-based systems, firms raise capital directly from investors through competitive financial markets.

Even though Levine (2002) finds that the distinction between market-based and bank-based systems is largely irrelevant to actual economic performance, we believe that regulators continue to view and regulate financial systems in the light of this dichotomy. This suggests that countries will differ in their type of regulatory response according to the nature of their financial system, where the nature of their financial system is defined on a continuum of bank-based to market-based. Specifically, countries which have a more bank-based financial system will focus the bulk of their regulatory and supervisory efforts on banks, instead of financial markets, while countries with a more market-based financial system will focus the bulk of their regulatory and supervisory efforts on financial markets, instead of banks.

Regulatory structure and path dependence

Masciandaro (2006) highlights the issue of path dependence in regulatory decisions. Path dependence refers to the concept of historical decisions influencing present decision-making; in the case of regulatory regimes, it refers to the impact that

historical and recent regulatory decisions may exert on regulators in the present. Masciandaro (2006) finds that the path dependence effect explains the degree to which supervisory unification is present in his sample of 68 countries. In particular, the degree of central bank involvement in the financial system determines to a large extent whether regulatory supervision is concentrated in one institution. Accordingly, countries' regulatory response to new financial challenges is likely to be dependent, to some degree, on the nature of existing regulatory bodies.

3. Methodology

This section addresses research design. Section 3.1. develops testable hypotheses, Section 3.2. introduces the dataset, while Section 3.3. outlines the approach to coding and analyzing the data.

3.1. Hypotheses

As noted in the introduction the objective of this paper is to understand how different G20 countries are interpreting and implementing the FSB/FSF recommendation that:

“Supervisors should see that they have the requisite resources and expertise to oversee the risks associated with financial innovation and to ensure that firms they supervise have the capacity to understand and manage the risks.”(FSF 2008, p.40)

We will conduct content analysis on G20 countries' progress with respect to these recommendations. The significance of the research from a policy and practitioner perspective will be to highlight jurisdictional differences across the G20 in terms of the scope, nature and level of implementation of these recommendations. Using the *FSB Implementation Monitoring Network Survey*, Diaz-Rainey and Ibikunle (2012) suggest that there are large international differences between G20 countries and a general failure to treat risk from financial innovation in a thematic and comprehensive manner. However, this observation was based only on a selected group of G20 countries and using one reporting year. There is clearly a need to systematically analyse all responding countries over the period that they have been reporting. Nevertheless, from this initial analysis of the *FSB Implementation Monitoring Network Survey* by Diaz-Rainey and Ibikunle (2012) we derive our first hypothesis;

H₁: There is a failure to treat risk from financial innovation in a thematic and comprehensive manner

Following on from the discussion of the 'regulatory cycle' and 'regulatory capture' (Section 2.2) the influence of past financial crises on the survey response is also assessed through our second hypothesis.

H₂: Past experience with financial crises will be reflected in the strength of response of each country

The possible outcomes of this hypothesis are unclear. For instance, countries with a limited history of past financial crisis or no financial crisis may be in this situation due to robust forms of past regulation and a proactive attitude towards new and developing risks therefore enabling financial crises to be avoided. This may relate to a

relatively weak financial sector unable to lobby (Leiserson, 1946) or capture regulators (Stigler, 1971) or from a more interventionists ethos that 'reign in' financial excesses.

For a country which has previously suffered substantial costs from past financial crisis two possible outcomes are plausible. On the one hand, it would be aware of the needs to regulate robustly and amend firm behaviours to reduce the severity and occurrence of future financial crisis. Thus, financial crises act as an exogenous shock to regulatory systems to create external pressures (political, reputational) that increase the demanded level of regulation, then it seems reasonable that these crises will motivate existing regulators to re-organise such that they are reasonably free of regulatory capture, or for new, un-captured regulators to replace old, captured regulators. Therefore it might be expected that having a history of past financial crises is linked to a stronger response to the survey. On the other hand, the 'regulatory cycle' suggests that though initially new regulators may pursue the public interest robustly, lobbying and regulatory capture may ultimately weaken regulators over time (Bernstein, 1955; Martimort, 1999; Stigler, 1971), allowing for new financial excesses to arise. It is plausible that this is more likely in countries that have strong financial sectors. Overall, this suggests that the relationship between past crises and measures implemented may not be linear and may be moderated by the strength of the financial system.

Following the discussion of market based and bank based systems in Section 2.3 it is hypothesised that the type of financial system of a jurisdiction is likely to affect the nature of the response to the recommendation.

H₃: Countries will differ in their type of response according to the nature of their financial system

It is helpful to consider the type of legal system in this context in that the form of law has been closely associated (see La Porta *et al* 1998) with the level of property and creditor rights in different nations. French and German legal systems have been associated with lower levels of creditor protection and in turn different forms of financial system, where larger shareholding and bank financing are relatively more common. English legal systems are frequently associated with a greater diversity in firm financing, more market financing for firms and also greater protection for minority shareholders.

Lastly, building on the discussion of path dependency in Section 2.3 we consider regulatory structure to hypothesise that;

H₄: Countries' response to the FSB recommendation will be affected by regulatory structure (degree of concentrated and central bank power)

This is undertaken in two parts and draws on the classification of regulatory systems provided by Masciandaro (2006). Masciandaro classified the regulatory in two ways. Initially the number of financial regulators was determined in order to determine the degree of regulatory concentration. This Index has a maximum score in nations where all the financial supervision responsibilities are undertaken by a single agency. This is a case in some nations such as the sample period the United Kingdom or Germany.

Conversely, the Index has a lower score in nations where more agencies have responsibility for financial regulation and supervision such as within the US or France. The influence of the regulatory structure is important as centralised regulators have either correctly or otherwise been associated with greater decision making abilities (Goodhart, 2000) relative to more fragmented regulatory systems.

The second measure considers the role of the central bank in financial regulation and supervision. The role of central banks has also been the issue of much discussion. It has been proposed that as central banks have extensive experience in the workings of both banking and financial markets they are well placed to undertake financial regulation effectively (Goodhart and Schoenmaker 1998). While in recent years this perspective has been criticised by some commentators from nations with high central bank power (e.g. Westrup 2012), the central bank can be influential in financial regulatory structures. To measure the central bank's involvement in financial supervision, we adopt Masciandaro's measure where a greater value is assigned when the central bank is the only body responsible for banking supervision.

3.2. Data

G20 member responses were hand collected from the FSB's web site.³ 73 reports from 25 member jurisdictions were downloaded. Three reports spanning the years 2010, 2011, and 2012 were downloaded for each member jurisdiction, except for India which had only one report for 2012. It was not possible to use 2013 data as the next round of reports will only be made publicly available in September 2013, during the next G20 summit. Table 1 provides a list of member jurisdictions covered in this dataset. In 2010 and 2011, G20 members were encouraged to follow the reporting format in Panel B of Table 1, while the format changed in 2012 (Panel C).

[Insert Tables 1 and 2 about here]

Of the 73 observations (henceforth referred to as reports or report extracts) there were six blank observations (Indonesia 2010, Russia 2010-2012, Turkey 2012, The Netherlands 2010). Some countries had the same responses in consecutive years. The examples given in Table 2 for Australia and China in 2010 and 2011 show this trend. This trend seems to exist mainly for 2010 and 2011 responses and not for 2012 responses. This could be because of the change in reporting format as described above. The responses to 'Progress to Date' range from short responses to long, detailed responses.

3.3. Coding and coding reliability

Content analysis is commonly used in disclosure studies (Beattie and Thomson, 2007) and was the method used to extract the data in this study. The narrative descriptions of progress on reforms related to risk from financial innovation in the 73 2010-12 FSB Report extracts were read manually and concurrently coded to allow quantitative analysis of those responses (Guthrie *et al*, 2004). Figure 1 displays the coding schema used. Information for Section A was easily recorded from the report extracts. However, information for Sections B-D required the coder to read the narrative for

³ http://www.financialstabilityboard.org/implementation_monitoring/jurisdiction.htm

meaning and make a judgement about the evidence presented. Evidence of a response in a particular cell was coded as 1 and absence as 0. These scores could then be accumulated by section, year or G20 country as required in order to provide measures of type or strength of response for the hypotheses analysis.

[Insert Figure 1 about here]

Because content analysis requires judgement on the part of the coder, rigorous steps to ensure reliability (accuracy, stability and reproducibility) of the data were implemented. These steps consisted of a research team discussion to develop a predetermined standard and accurate coding schema before coding commenced; an initial training period of the main coder (Coder 1), a coding trial, periodic recoding of several reports by the main coder to test for stability of coding over time, and recoding of several reports by a second coder (Coder 2) to test for inter-coder reproducibility of the coding (Krippendorff, 1980; Lombard *et al.* 2002; Whiting & Woodcock, 2011). The coding trial, stability and reproducibility tests are described in more detail below. Krippendorff alphas, which provide a measure of the agreement between two sets of coding decisions, were calculated to ensure that stability and reproducibility met acceptable criteria. More formally, Krippendorff alpha is given by,

$$\alpha = 1 - \left(\frac{D_o}{D_e} \right) \quad (1)$$

where D_o is the observed disagreement among values assigned to units of analysis and D_e is the disagreement one would expect due to chance rather than to the properties of these units (see for Krippendorff, 1980 and Krippendorff, 2011 for a more detailed derivation and discussion of the advantages of the measure relative to other alternatives). An α of +0.75, or above, is considered to be a minimum acceptable standard of reliability (Milne and Adler, 1999).

[Insert Tables 3 and 4 about here]

Table 3 details the series of tests undertaken during the coding of the FSB reports and Table 4 reports the results of the Krippendorff alpha reliability tests. We calculated the Krippendorff alphas using the algorithm outlined in Hayes and Krippendorff (2007), thereby allowing us to report bootstrap derived confidence intervals for α .

An initial trial of three countries' reports over three years highlighted several areas for research team discussion and subsequent extra guidance in coding and these are described in Appendix 1. After standardising the coding decision rules, the coding (at the subsection level) of these nine reports by the two coders (inter-rater reliability or reproducibility) showed acceptable agreement with $\alpha = 0.84$ (Table 4, Stage 1), and the coding for analysis by Coder 1 commenced.

During the data gathering, tests for the stability or "consistency" of content analysis coding were undertaken. These were implemented after the first 28 reports had been coded (Stage 3) and again at the end of the coding of the 73 reports (Stage 5). A test-retest procedure was used, with the six reports (2010-12) from China and Brazil being

re-coded each time. Calculated Krippendorff alphas of 0.87 and 0.88 (Table 4) indicate highly stable coding by Coder 1.

To test reproducibility a ‘test-test’ procedure was used. “The aim of reproducibility is to measure the extent to which coding is the same when multiple coders are involved” (Weber, 1988, cited in Milne and Adler, 1999, p. 239). Three other reports which had been previously coded by Coder 1 were also coded by Coder 2 at Stages 3 and 5 (Table 3) and the Krippendorff alphas of 0.83 and 0.87 (Table 4) indicate a high level of agreement between coders. Both the stability and reproducibility tests provide confidence that the data collected is highly reliable.

4. Results and Discussion

Building on the literature review, four hypotheses were identified in Section 3.1. We discuss our results in terms of these hypotheses in turn.

H₁: there is a failure to treat risk from financial innovation in a thematic and comprehensive manner

[Insert Tables 5 and 6 about here]

How jurisdictions have responded and which areas of financial market activity have been the focus of attention in the survey responses are outlined in Table 5 and 6. From these tables we can observe there is a dispersion of responses and a variety of areas of interest identified in the responses considered. More specifically, from Table 5 it is reported that, across the twenty-five G20 jurisdictions, a total of 61 measures were planned or implemented as a result of the recommendation. Most of the measures reported by countries were already implemented (82%) with only eleven (18%) being indicated as “planned next steps”. This suggests very little forward planning to tackle the recommendation. Further, most planned or implemented measures (additional/new recruitment, training, guidelines) were easier to implement relative to more challenging measures (new laws/acts, regulators, committees). The three most common types of measures implemented or planned were training (28%), a new monitoring body (e.g. Committee) (18%) and recruitment (15%).

At a disaggregate country level, Table 6 provides *basic information* about the nature of the responses, the *interpretation* of the recommendation and the *measures* implemented or planned. For instance, Germany responded all three years but provided the same response (original =1) all three years whereas the EU provided a different response each year (original =3).

Large interpretative differences of the recommendation across countries are also apparent. For instance Table 6 indicates whether the response is regulatory in focus or considers amendments to how financial firms should or must operate. It is reported that 92% of states have interpreted the recommendation in terms of regulatory capabilities with only 52% emphasizing firm capabilities as well. This suggests that numerous states have had a limited *interpretation* of the scope of the recommendation. This bias towards regulatory relative to firm capabilities is even more accentuated when looking at the average number of *measures* implemented or

planned; 2.2 for regulatory capabilities and only 0.24 for firm capabilities. This equates to 90% of all measures planned or implemented relating to regulatory capabilities with only the remaining 10% relating to firm capabilities (See Table 5).

Table 6 also records the markets or sub-sector *interpretation* of the recommendation by different jurisdictions (Banking, Capital Markets, Personal Finance, Insurance, Systemic or Commodities). No country or jurisdiction interpreted the recommendation in terms of all six sub-sectors but Argentina, France, Italy, Singapore and the UK had broad interpretations mentioning five. Most countries interpreted the recommendation in terms of Banking (76%) and Capital Markets (76%) with only 32% and 4% focussing on Personal Finance and 4% on Commodities, respectively. Again, it can be concluded that large interpretive differences are evident.

When considering the *strength* of response to the survey the average response (2.75 out of a possible maximum of 10) is of a low strength indicating that relatively less text is provided and the text may not vary substantially year to year (Table 6). The strongest response was attributed to China (8) followed by Hong Kong and the UK (both 5). Further, from Table 6 it is clear that some jurisdictions have been more proactive in implementing measures than others, with China implementing the most measures (n=9) and The Netherlands and Singapore not having implemented any.

When addressing Hypothesis 1 we conclude that overall there appears to be a failure to treat risks from financial innovation in a thematic and comprehensive manner in most but not all cases. Clearly what can be seen is a diversity of responses in the survey representing large interpretative differences and large differences in terms of strength of response.

H₂: Past experience with financial crises will be reflected in the strength of response of each country

The degree to which an individual nation has suffered past financial crises is considered through reference to the IMF data set on past financial crises (see Laeven and Valencia, 2008). A summary of the past history of financial crises since 1970 for G20 jurisdictions is contained in Appendix 2. These variables are then used to determine if this past history of financial crises has influenced the survey responses.

[Insert Tables 7 and 8 about here]

In Table 7 we observe the strength of regulatory response, whether this response was directed at regulators or firms and the financial markets considered. The assessment is divided into three panels outlining a) whether a nation has been in a systemic financial crisis since 1970 or not, b) the number of systemic financial crises the nations has been involved with since 1970, and c) the time since the jurisdiction has been affected by a systemic financial crisis. From this descriptive assessment a number of findings are apparent.

Overall from Panel A we observe not having a history of past systemic financial crisis (e.g. Australia, Canada or Saudi Arabia) is positively associated with the strength of the survey response. This said this relationship is clearly more complex when considering panel B with nations having a history of multiple systemic financial crisis

(e.g. Argentina) also providing with strong survey responses. When considering the years elapsed since the last financial crisis in a nation either having no history of financial crisis or having a recent financial crisis are most strongly associated with the strength of the survey response. Other relationships may also be observed between the history of financial crisis and the types of financial markets considered. Insurance and personal finance are considered more frequently when there is no history of financial crisis and time since a financial crisis has occurred.

The influence of past systemic financial crisis is also considered relative to the actions undertaken to combat challenges arising from financial innovation. In Table 8 we present the link between the types of regulatory measures proposed or implemented and past experience of systemic financial crisis. We observe that the recruitment of regulatory staff and reorganisation of the regulator to accommodate the challenges of financial innovation is present when there is no past financial crisis. For nations with a history of financial crisis, however, changes to guidelines and the proposed legal changes appear with a relatively higher frequency.

Considering the number of past financial crises, clearly the jurisdiction with four past systemic financial crises (Argentina) is skewing the results through responding to financial innovation concerns with a range of different amendments in training and other measures particularly. Otherwise we can indicate that for issues other than enacting guidelines, not having a history of systemic financial crises leads to more enacting changes due to concerns with financial innovation. For measures proposed, a nation with past financial crises will also have more proposed guidelines and legal changes than a country without a history of systemic financial crises. These findings are also similar to the differences observed for the time since a systemic financial crisis.

This form of analysis is also undertaken for all financial crises, including systemic financial crises considered here and also currency crises, debt default and loan rescheduling events. These findings are broadly similar to those seen for systemic financial crisis and are presented in Appendix 3. Overall it can be stated that no history of financial crisis is generally a good indication of stronger responses to the survey. This statement is made with the caveat that where there have been repeated and severe past financial crises strong survey responses may also be recorded.

H₃: Countries will differ in their type of response according to the nature of their financial system

Whilst many approaches might be considered to characterise the financial system of countries, we consider the form of the legal system. Following the definition of legal systems provided by La Porta *et al.* (1998) we classify all our jurisdictions either following English, French, German or 'other' form of legal system. This classification of jurisdictions is provided in Appendix 4. In the analysis we examine the type and focus of response to the financial innovation questionnaire and then consider what forms of action have been enacted or proposed relative to this classification. This is undertaken in Tables 9 and 10 respectively.

[Insert Tables 9 and 10 about here]

In Table 9 we compare the type of legal system to the type and focus of responses. We can observe that some significant differences exist between these definitions. Responses from nations with English type legal systems have higher results for the strength of survey response relative to French, German legal systems. Overall other legal systems such as those observed in Saudi Arabia or China, and based on Islamic and communist principles respectively, provide the strongest survey responses overall. Nations operating an English type legal system also appear to have placed greater attention on certain markets, considered with less frequency by other nations. For example these nations have placed a greater focus on personal finance markets for example. We also observe that nations operating a German type legal system have focused more on the role of banking in financial innovation concerns, potentially reflecting the greater role played by banks in such nations. German and English based systems also place more emphasis on financial markets in their responses.

In Table 10 we observe the relationships between the type of legal system and the type of measures enacted and proposed relative to financial innovation. For jurisdictions operating an English type legal system there is more emphasis placed on enacted regulatory guidelines and proposed regulatory guidelines. By way of contrast, countries operating a French type legal system have reported more implemented training more frequently. Jurisdictions operating ‘other’ legal systems are also linked more frequently with more proposed measures such as changes to law and guidelines. Overall we can report that the form of legal system and by implication the form of banking and financial system does result in noticeably different responses to the questionnaire.

H4: Countries’ response to the FSB recommendation will be affected by regulatory structure (degree of concentrated and central bank power)

The relationship between the type and focus of survey responses and the classifications of regulatory structure are presented in Table 11. As noted in Section 3.1 we use two measures developed Masciandaro (2006); one relating to concentration and the other to central bank power.

[Insert Table 11 about here]

In Table 11 we can observe there is a strong positive link between regulatory concentration and strength of response. Therefore where few regulators have responsibility there is a stronger survey response. Central bank power is also associated with stronger survey responses and an emphasis on certain financial markets. For example in nations with weaker central bank power (e.g. Germany, Japan, Turkey) more emphasis is placed on assessing the role of banks and financial markets in financial innovation. Distinctly in nations with more central bank control (e.g. France, Spain, Netherlands) over financial regulation other markets are considered with greater frequency with greater weight placed on systemic concerns and to a lesser degree insurance markets. There is also a weak positive link between regulatory recruitment and regulatory concentration. When considering central bank power there is a weak positive relationship between the strength of survey response and central bank power, a positive relationship between central bank power and whether a response requires firm actions and a negative relationship between central bank power and enacted regulatory training.

Overall, it is apparent that more concentrated regulatory structures and regulatory structures in which the central bank has a more influential role are associated with stronger responses to the G20 survey. Further these regulatory attributes also influence the form of responses undertaken.

5. Conclusion

Overall our results suggest that G20 states have found it difficult to interpret and address the FSB recommendation related to financial innovation in a comprehensive and thematic manner. This has ultimately led to the recommendation being given a low priority. This is an issue of major concern if, as many agree, financial innovation played an important role in the GFC. It would seem that G20 states need guidance on how to interpret (thematically) and how best to tackle this recommendation. This should come from an assessment of best practice in this area both in terms of measures implemented since the GFC and in terms of measures that buffered countries from the effect of the GFC *ex ante*. Our coding of G20 states responses to the FSB recommendation should assist in the process of exploring best practice in this area.

Acknowledgments

We thank Stephanou Costas (BIS/FSB) for answering data related questions.

Appendices

Appendix 1: Coding Decision Rules for Subsections

1. Coding 9.1 and 9.2

Yes (Presence = 1) = Must materially or substantively address the issue of financial innovation.

E.g. Australia, 2012 - key phrases such as “*keeps pace with industry*” and “*relevant market experience*” when discussing training and recruitment i.e. thereby addressing the dynamic nature of financial innovation.

No (Absence = 0) = Does not materially or substantively address the issue of financial innovation.

e.g. Australia, 2010 and 2011 – general responses such as “*The budgetary resources allocated to APRA and ASIC are regularly monitored to ensure they continue to be adequate*”.

2. Coding 10.1 to 10.6

If there is new text in a subsequent year and a substantive response (i.e. 9.1 or 9.2 are coded 1) then code, then new references to particular sectors should be coded as 1 but not as a count if there are multiple references)

3. Consistency issue for null cases for 13, 16, 19 and 22.

Only complete 13 and 16 if there is a 1 in 9.1.

Only complete 19 and 22 if there is a 1 in 9.2.

Appendix 2: Past financial crisis in the responding nations.

[Inset Table A2 here]

Appendix 3: Effect of past financial crises on interpretation and measures

[Inset Table A3 here]

Appendix 4: Forms of legal system adopted by the responding nations.

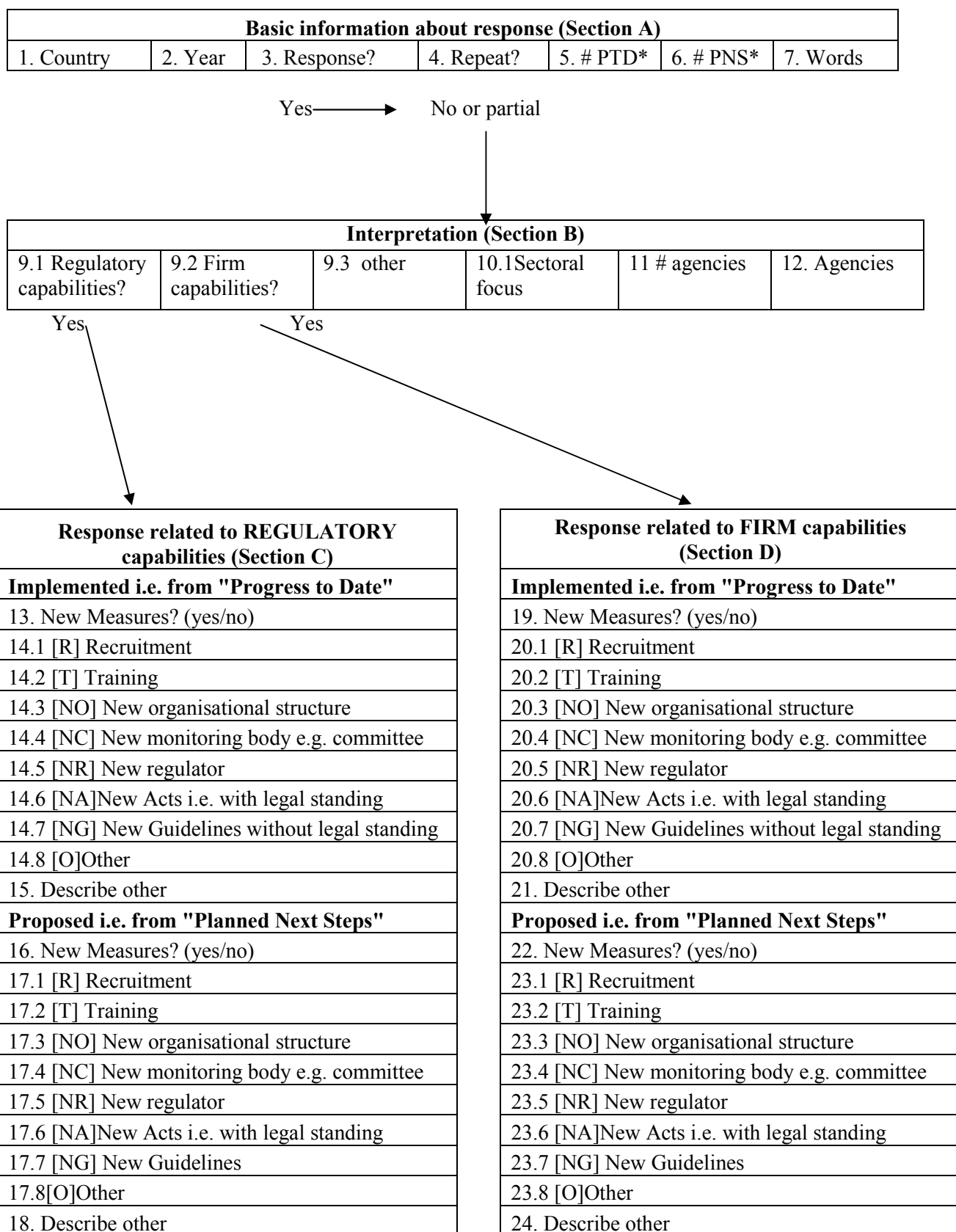
[Inset Table A4 here]

References

- Allen, F. (2012). Trends in Financial Innovation and their Welfare Impact: an Overview. *European Financial Management*, 18(4), 493-514.
- Allen, F., Yago, G. (2010). *Financing the Future: Market-Based Innovations for Growth*, Upper Saddle River, NJ, Pearson Education.
- Beattie, V., Thomson, S.J. (2007) Lifting the lid on the use of content analysis to investigate intellectual capital disclosures, *Accounting Forum*, 31, 129-163
- Bergstresser, D. (2008). The retail market for structured notes: Issuance patterns and performance, 1995-2008, Harvard Business School, Boston MA.
- Bernstein, M. (1955). *Regulatory business by independent commissions*. Princeton: Princeton University Press.
- Brunnermeier, M. K. (2009). Deciphering the Liquidity and Credit Crunch 2007-2008", *Journal of Economic Perspectives*, 23(1), 77-100.
- Diaz–Rainey, Ivan, & Ibikunle, Gbenga. (2012). A taxonomy of the 'dark side' of financial innovation: the cases of high frequency trading and exchange traded funds. *International Journal of Entrepreneurship and Innovation Management*, 16(1), 51-72.
- Fostel, A., Geanakoplos, J. (2012). Tranching , CDS, and Asset Prices: How Financial Innovation Can Cause Bubbles and Crashes. *American Economic Journal: Macroeconomics*, 4(1), 190-225.
- Frame, W. S. and L. J. White (2004). Empirical Studies of Financial Innovation: Lots of Talk, Little Action?, *Journal of Economic Literature*, 42(1), 116-144.
- Gennaioli, N., Shleifer, A., Vishny, R. (2012). Neglected risks, financial innovation, and financial fragility. *Journal of Financial Economics*, 104(3), 452-468.
- Goodhart, C. (2000). The organizational structure of banking supervision, FSA Occasional Paper, No. 1, 25 October.
- Goodhart, C. and Schoenmaker, D. (1998). Should the functions of monetary policy and banking supervision be separated?, *Oxford Economic Papers*, 47(4), 539-560.
- Guthrie, J., Petty, R., Yongvanich, K., Ricceri, F. (2004). Using content analysis as a research method to inquire into intellectual capital reporting, *Journal of Intellectual Capital Reporting*, 5(2), 282-293.
- Hayes, A. F., and Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures*, 1, 77-89.
- Hendershott, T., Jones, C. M., & Menkveld, A. J. (2011). Does algorithmic trading improve liquidity?. *The Journal of Finance*, 66(1), 1-33.
- Henderson, B. J., Pearson, N. D. (2011) The dark side of financial innovation: A case study of the pricing of a retail financial product, *Journal of Financial Economics*, 100(2), 227-247.
- Kim, Teakdong, Koo, Bonwoo, & Park, Minsoo. (2012). Role of financial regulation and innovation in the financial crisis. *Journal of Financial Stability*, in press
- Krippendorff, K. (1980) *Content Analysis. An Introduction to its Methodology*, Sage, Beverly Hills, CA.
- Krippendorff, K. (2011). *Computing Krippendorff's alpha-reliability*, Annenberg School for Communication, Departmental Papers, University of Pennsylvania
- La Porta, R, Lopez deSilanes, F, Shleifer, A. and Vishny, R. W., (1998). Law and Finance, *Journal of Political Economy*, 106, 1113-1155.

- Laeven, L. and Valencia, F. (2008). Systemic Banking Crises: A New Database, IMF Working Paper, WP/08/224, The International Monetary Fund, New York.
- Laffont, J. J., & Tirole, J. (1991). The politics of government decision-making: A theory of regulatory capture. *The Quarterly Journal of Economics*, 106(4), 1089-1127.
- Leiserson, A. (1946). *Interest groups in administration*, In F. M. Marx (Ed.), *Elements of public administration*, (pp. 314-338). New York, NY: Prentice-Hall.
- Lerner, J., Tufano, P. (2011). The Consequences of Financial Innovation: A Counterfactual Research Agenda. National Bureau of Economic Research Working Paper Series, No. 16780.
- Levine, R. (2002). Bank-based or market-based financial systems: Which is better?. *Journal of Financial Intermediation*, 11(4), 398-428.
- Lombard, M., Snyder-Duch, J. and C. Campanella Bracken (2002). "Content analysis in mass communication. Assessment and reporting of inter-coder reliability", *Human Communication Research*, 28, 587-604.
- Martimort, D. (1999). The life cycle of regulatory agencies: dynamic capture and transaction costs. *The Review of Economic Studies*, 66(4), 929-947.
- Masciandaro, D. (2006). E Pluribus Unum? Authorities' design in financial supervision: trends and determinants. *Open Economies Review*, 17(1), 73-102.
- Mason, J. R. (2008). The Summer of '07 and the Shortcomings of Financial Innovation, *Journal of Applied Finance*, 18:1, 8-15.
- Merton, R.C. (1995). Financial innovation and the management and regulation of financial institutions. *Journal of Banking & Finance*, 19(3-4), 461-481.
- Miller, M. H. (1986) Financial Innovation: The Last Twenty Years and the Next, *The Journal of Financial and Quantitative Analysis*, 21:4, 459-471
- Milne, M.J., Adler, R.W. (1999). Exploring the reliability of social and environmental disclosures content analysis, *Accounting, Auditing and Accountability Journal*, 12:2, 237-256.
- Shiller, R.J. (2013). Capitalism and Financial Innovation. *Financial Analysts Journal*, 69(1), 21-25.
- Stigler, G. (1971). The theory of economic regulation. *The Bell Journal of Economics and Management Science*, 2(1), 3-21.
- Thakor, A. V. (2012). Incentives to innovate and financial crises. *Journal of Financial Economics*, 103(1), 130-148.
- Van Horne, J. C. (1985). Of Financial Innovations and Excesses, *The Journal of Finance*, 40:3, 620-631.
- Weber, R.P. (1988) *Basic Content Analysis*, Sage University Paper Series on Quantitative Applications in the Social Sciences, Series No 07-049, Sage, Beverly Hills, CA.
- Westrup, J. (2012) 'Regulatory Governance', in N. Hardiman (ed). *Irish Governance in Crisis*, Manchester: Manchester University Press, 64-82.
- Whiting, R.H., Woodcock, J. (2011). Firm Characteristics and Intellectual Capital Disclosure by Australian Companies, *Journal of Human Resource Costing and Accounting*, 15:2, 102-126.

Figure 1: Coding Schema



* PTD = Progress to Date, PNS = Planned Next Steps

Table 1: The Dataset

Panel A: List of G20 member jurisdictions covered in this dataset		
1. Argentina	10. Indonesia	19. South Africa
2. Australia	11. Italy	20. Spain
3. Brazil	12. Japan	21. Switzerland
4. Canada	13. Republic of Korea	22. Turkey
5. China	14. Mexico	23. United Kingdom
6. France	15. The Netherlands	24. United States of America
7. Germany	16. Russia	25. European Commission
8. Hong Kong SAR	17. Saudi Arabia	
9. India	18. Singapore	
Panel B: Reporting Format 2010 and 2011		
1. Deadline		
2. Progress to date:		
a. In addition to information on progress to date, specifying steps taken, please address the following questions:		
i. Have there been any material differences from relevant international principles, guidelines or recommendations in the steps that have been taken so far in your jurisdiction?		
ii. Have the measures implemented in your jurisdiction achieved, or are they likely to achieve, their intended results?		
b. Also, please provide links to the relevant documents that are published.		
3. Planned next steps:		
a. Timeline, main steps to be taken and key mileposts (Do the planned next steps require legislation?)		
b. Are there any material differences from relevant international principles, guidelines or recommendations that are planned in the next steps?		
c. What are the key challenges that your jurisdiction faces in implementing the recommendations?		
Panel C: Reporting Format 2012		
1. Deadline		
2. Progress to date:		
a. Implementation ongoing:		
b. Draft regulations/guidelines being developed, expected publication by:		
c. Draft regulations/guidelines published as of:		
d. Final rules expected to be in force by:		
e. Others, please specify:		
f. Completed as of:		
g. Overview (short description) of action(s) taken:		
h. Web-links to relevant documents:		
3. Planned next steps:		
a. Planned actions (if any):		
b. Expected commencement date:		
c. Web-links to relevant documents:		

Table 2: Sample responses

Australia, 2010 and Australia, 2011
“The budgetary resources allocated to APRA and ASIC are regularly monitored to ensure they continue to be adequate.”
China, 2010 and China, 2011
<p>"The CBRC has established a department to regulate financial innovation and made it clear that commercial banks should be well informed of their counterparties, businesses and risks, and estimate related costs. The CBRC has issued rules on conducting prudential regulation over specific businesses, to guide banking financial institutions, including the Guidance on Financial Innovation of Commercial Banks and Guidance for Supervision and Management of Asset Backed Securitisation.</p> <p>In accordance with the Securities Law and the Regulation on the Supervision and Administration of Securities Companies, the CSRC fulfils the responsibility of supervision and administration of securities companies. Securities companies and their domestic subsidiaries shall not be engaged in a certain business unless approved by the CSRC. In order to effectively control risks, the financial innovation of securities companies should also be supervised by the CSRC.</p> <p>The CIRC regulated various businesses and the use of insurance funds, encouraged innovation by market participants in line with regulatory requirements, and built up institutional arrangements to prevent relevant risks. Administrative Rules on the Appointment Qualifications of Directors and Senior Managers of Insurance Companies and the Guiding Opinions on Corporate Governance Structure of Insurance Companies specify that directors must meet qualification requirements and have the operation and management capabilities required to assume their risk positions. The Guidelines on Risk Control over Management of Insurance Funds specify that the board of directors is responsible for making major investment decisions, developing investment strategy for new investment categories, reviewing risk control system and monitoring implementation of risk control measures."</p>

Source: FSB Implementation Monitoring Network Survey 2010 and 2011

Table 3: Stages of coding the data

Stage		Description	Number of reports	
			Coder 1	Coder 2
1	Trial & Reliability Test 1	Code three countries over three years (Argentina, Australia and China) and initial Reproducibility Test	9	9
2	First Ten	Coding of first ten countries in alphabetical order (including trial three)	28 ^a	n/a
3	Reliability Tests 2	Stability Test (China and Brazil)	6	n/a
		Reproducibility Test (surveys for EU 2011 ^b , France 2010 and Germany 2010)	n/a	3
4	Last Fifteen	Coding of last fourteen countries in alphabetical order (including trial three)	45	n/a
5	Reliability Tests 3	Stability Test (China and Brazil)	6	n/a
		Reproducibility Test (2010 surveys for Japan and the UK and the 2012 survey for the US ^c)	n/a	3

^a India only responded to the FSB survey in 2012

^b 2011 for the EU was used since the 2010 EU response to the FSB financial innovation recommendation was not substantive

^c 2012 for the US was used since the 2010 and 2011 US surveys responses to the FSB financial innovation recommendation were not substantive

Table 4: Krippendorff's Alpha for stability and reproducibility (inter-coder reliability)

Stability	Alpha	q*	LL95%CI	UL95%CI	Observrs	Pairs (n)	Bootstraps
Total	0.910	0.000	0.8577	0.9483	3	223	1000
Stage 3	0.873	0.039	0.7823	0.9637	2	78	1000
Stage 5	0.880	0.031	0.7804	0.9601	2	73	1000
Reproducibility	Alpha	q*	LL95%CI	UL95%CI	Observrs	Pairs (n)	Bootstraps
Total	0.8420	0.086	0.7827	0.8946	2	230	1000
Stage 1	0.8359	0.149	0.7538	0.9062	2	124	1000
Stage 3	0.8268	0.402	0.6824	0.9423	2	56	1000
Stage 5	0.8675	0.112	0.7349	0.9669	2	50	1000

*Probability (q) of failuff's Alpha of at least alphamin .8000

Table 5: Summary of Scope and Type of Planned and Implemented Measures (per country n=25)

Scope and Type of measure	Recruitment	Training	New Organisational Structure	New Monitoring Body	New regulator	New Acts	New Guidelines	Other	Total	Percent
Regulator (Implemented)	8	13	5	9	0	5	4	0	44	72%
Regulator (Planned)	1	2	3	2	2	0	0	1	11	18%
Firm (Implemented)	0	2	0	0	0	1	3	0	6	10%
Firm (Planned)	0	0	0	0	0	0	0	0	0	0%
Total	9	17	8	11	2	6	7	1	61	100%
Percent	15%	28%	13%	18%	3%	10%	11%	2%	100%	

Table 6. Nature of response, interpretation and measures by country^a

Country	Basic information about response				Interpretation									Measures		
	Responses	Original	Words	Strength ^b	Reg.	Firm	Banking	Markets	Personal	Insurance	Systemic	Commod.	Total	Reg.	Firm	Total
Argentina	3	2	243	4	1	0	1	1	1	1	1	0	5	6	0	6
Australia	3	1.5	146	2	1	0	0	1	0	0	0	0	1	3	0	3
Brazil	3	2	412	3	1	1	1	1	0	0	1	0	3	6	0	6
Canada	3	2	425	4	1	0	1	1	1	0	1	0	4	3	0	3
China	3	1.5	369	8	1	1	1	1	0	1	0	0	3	6	3	9
EU	3	3	104	1	1	0	1	1	0	1	1	0	4	3	0	3
France	3	2	235	5	1	1	1	1	1	1	0	1	5	5	0	5
Germany	3	1	107	3	1	1	1	1	0	1	1	0	4	2	0	2
Hong Kong	3	2	485	5	1	1	1	1	0	1	1	0	4	3	0	3
India	1	1	262	2	1	1	0	1	1	0	0	0	2	1	0	1
Indonesia	2	1.5	283	2	1	1	1	0	0	0	1	0	2	1	0	1
Italy	3	2	338	4	1	1	1	1	1	1	1	0	5	3	1	4
Japan	3	1	187	2	1	1	1	1	0	1	1	0	4	1	0	1
Korea	3	1.5	51	1	1	0	1	1	1	0	1	0	4	2	0	2
Mexico	3	1	64	1	1	0	0	1	0	0	0	0	1	1	0	1
Netherlands	2	1.5	62	1	1	1	0	0	0	0	1	0	1	0	0	0
Saudi Arabia	3	1	100	3	1	1	1	1	0	1	1	0	4	1	1	2
Singapore	3	1	261	3	1	1	1	1	1	1	1	0	5	0	0	0
South Africa	3	1.5	287	4	1	1	1	1	0	1	1	0	4	3	0	3
Spain	3	1.5	195	2	1	0	1	0	0	1	1	0	3	0	0	0
Switzerland	3	1.5	132	2	1	0	1	1	0	1	0	0	3	1	0	1
Turkey	2	1	23	0	0	0	0	0	0	0	0	0	0	0	0	0
UK	3	2.5	426	5	1	0	1	1	1	1	1	0	5	4	0	4
United States	1	1	114	1	1	1	1	0	0	0	0	0	1	0	1	1
Average	2.60	1.50	212.44	2.72	0.92	0.56	0.76	0.76	0.32	0.56	0.64	0.04	3.08	2.20	0.24	2.44
SD	0.82	0.61	140.05	1.86	0.28	0.51	0.44	0.44	0.48	0.51	0.49	0.20	1.63	2.00	0.66	2.27
Maximum	3.00	2.50	485.00	5.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.00	5.00	1.00	5.00
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

^a Russia did not respond to the recommendation in any of the three years; ^b this is a subjective strength of response given by Coder 1.

Table 7: Effect of past systemic financial crises (since 1970) on interpretation

		In a systemic financial crisis since 1970 Yes/no			
		No	Yes		
Panel A	Strength of response	3.27	2.30		
	Regulatory response	0.64	0.53		
	Firm response	0.30	0.15		
	Other response	0.00	0.00		
	Banking	0.30	0.40		
	Markets	0.42	0.35		
	Personal	0.15	0.15		
	Insurance	0.33	0.28		
	Systemic	0.36	0.28		
	Commodities	0.03	0.00		
	Number of agencies	2.00	2.29		
	<hr/>				
		Number of Past Systemic Financial crises since 1970.			
		0	1	2	4
Panel B	Strength of response	3.27	2.82	1.25	4.00
	Regulatory response	0.64	0.59	0.33	1.00
	Firm response	0.30	0.18	0.17	0.00
	Other response	0.00	0.00	0.00	0.00
	Banking	0.30	0.50	0.17	0.33
	Markets	0.42	0.36	0.25	0.33
	Personal	0.15	0.23	0.00	0.33
	Insurance	0.33	0.32	0.00	0.67
	Systemic	0.36	0.32	0.08	0.67
	Commodities	0.03	0.00	0.00	0.00
	Number of agencies	2.00	2.31	1.00	3.00
	<hr/>				
		Years since last systemic financial crisis			
		0-10 years	11-20 years	>21 years	No crisis since 1970
Panel C	Strength of response	3.00	2.32	2.00	3.08
	Regulatory response	0.67	0.50	0.67	0.61
	Firm response	0.17	0.18	0.00	0.28
	Other response	0.00	0.00	0.00	0.00
	Banking	0.67	0.29	0.67	0.33
	Markets	0.50	0.32	0.00	0.44
	Personal	0.50	0.11	0.00	0.14
	Insurance	0.50	0.18	0.33	0.36
	Systemic	0.33	0.21	0.67	0.36
	Commodities	0.00	0.00	0.00	0.03
	Number of agencies	2.50	2.33	1.50	2.04

Table 8: Effect of past systemic financial crises on regulatory measures proposed and implemented

		Systemic financial crisis since 1970		Past systemic financial crises since 1970.				Years since last systemic financial crisis				
		No	Yes	0	1	2	4	0-10 years	11-20 years	>21 years	No crisis since 1970	
Regulatory Measures	Implemented	Measures	0.39	0.30	0.39	0.27	0.17	1.00	0.17	0.36	0.00	0.39
		Recruit	0.21	0.03	0.21	0.05	0.00	0.00	0.17	0.00	0.00	0.19
		Training	0.18	0.18	0.18	0.05	0.17	1.00	0.00	0.25	0.00	0.17
		Organisation	0.09	0.05	0.09	0.05	0.00	0.33	0.00	0.07	0.00	0.08
		Monitoring	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Regulator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Law	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Guidelines	0.09	0.15	0.09	0.14	0.17	0.33	0.33	0.14	0.00	0.08
	Other	0.39	0.30	0.39	0.27	0.17	1.00	0.17	0.36	0.00	0.39	
	Proposed	Measures	0.09	0.15	0.09	0.14	0.17	0.33	0.33	0.14	0.00	0.08
		Recruitment	0.09	0.05	0.09	0.05	0.00	0.33	0.00	0.07	0.00	0.08
		Monitoring	0.12	0.13	0.12	0.05	0.08	0.00	0.00	0.07	0.00	0.19
		Regulator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Law	0.00	0.13	0.00	0.14	0.17	0.00	0.00	0.18	0.00	0.00
Guidelines		0.03	0.08	0.03	0.14	0.00	0.00	0.00	0.11	0.00	0.03	
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

Table 9: Effect of legal system on interpretation

Legal system	English origin legal system	French origin legal system	German origin legal system	Other origin legal system
Strength of response	3.36	2.44	2.00	3.67
Regulatory response	0.68	0.63	0.50	0.33
Firm response	0.27	0.22	0.17	0.22
Other response	0.00	0.00	0.00	0.00
Banking	0.36	0.30	0.50	0.22
Markets	0.45	0.30	0.42	0.33
Personal	0.32	0.11	0.08	0.00
Insurance	0.27	0.26	0.33	0.33
Systemic	0.36	0.37	0.25	0.11
Commodities	0.00	0.04	0.00	0.00
Number of agencies	2.53	1.69	1.83	3.00

Table 10: Effect of legal systems on measures proposed and implemented

Legal system		English origin legal system	French origin legal system	German origin legal system	Other origin legal system	
Regulatory	Applied	Measures	0.32	0.41	0.25	0.33
		Recruit	0.18	0.07	0.17	0.00
		Training	0.09	0.33	0.08	0.11
		Organisation	0.09	0.07	0.08	0.00
		Monitoring	0.00	0.00	0.00	0.00
		Regulator	0.00	0.00	0.00	0.00
		Law	0.00	0.00	0.00	0.00
		Guidelines	0.23	0.11	0.08	0.00
		Other	0.32	0.41	0.25	0.33
	Proposed	Measures	0.23	0.11	0.08	0.00
		Recruitment	0.09	0.07	0.08	0.00
		Monitoring	0.09	0.11	0.00	0.11
		Regulator	0.00	0.00	0.00	0.00
		Law	0.00	0.07	0.00	0.33
		Guidelines	0.05	0.04	0.00	0.22
Other		0.00	0.00	0.00	0.00	

Table 11: Regulatory Concentration, Central bank power and survey responses

Regulatory Concentration								
	0	1	2	3	4	5	6	7
Strength of response	1.25	2.67	2.67	4.00	1.50	2.00	2.75	2.57
Regulatory response	0.50	0.56	0.67	0.83	0.50	0.67	0.58	0.60
Firm response	0.50	0.17	0.33	0.33	0.00	0.00	0.17	0.21
Other response	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Banking	0.25	0.28	0.22	0.33	0.33	0.00	0.58	0.33
Markets	0.25	0.28	0.33	0.33	0.50	0.67	0.50	0.38
Personal	0.25	0.11	0.11	0.33	0.00	0.00	0.33	0.17
Insurance	0.00	0.28	0.33	0.17	0.33	0.00	0.42	0.28
Systemic	0.00	0.33	0.56	0.50	0.00	0.00	0.42	0.33
Commodities	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.02
Number of agencies	1.50	2.00	1.50	3.20	1.00	1.50	2.57	2.09
Central bank power								
	1		2		3			
Strength of response	2.22		2.75		3.00			
Regulatory response	0.56		0.56		0.73			
Firm response	0.07		0.31		0.33			
Other response	0.00		0.00		0.00			
Banking	0.37		0.25		0.33			
Markets	0.44		0.25		0.40			
Personal	0.22		0.13		0.13			
Insurance	0.26		0.25		0.33			
Systemic	0.26		0.31		0.47			
Commodities	0.00		0.00		0.07			
Number of agencies	2.50		2.22		1.45			

Regulatory fragmentations = 1 least fragmented and 7 most fragmented.

Central bank power = the higher the value the greater the power of the central bank over regulation

Table A2: Past financial crises in the responding nations.

	Systemic financial crisis	Currency Crisis	Debt Crisis	Debt Restructuring	Total all financial crisis	Last crisis	Years since last crisis	Total all financial crisis	Years since last crisis
Argentina	4	4	2	2	12	2005	8	12	8
Australia	0	0	0	0	0			0	
Brazil	2	5	1	1	9	1999	14	9	14
Canada	0	0	0	0	0			0	
China	1	0	0	0	1	1998	15	1	15
France	0	0	0	0	0			0	
Germany	0	0	0	0	0			0	
Hong Kong	0	0	0	0	0			0	
India	1	0	0	0	0	1993	20	1	20
Indonesia	1	2	1	1	5	2002	11	5	11
Italy	0	1	0	0	1	1981	32	1	32
Japan	1	1	1	1	1	1997	16	1	16
Korea	1	1	0	0	2	1998	15	2	15
Mexico	2	3	1	1	7	1995	18	7	18
Russia	1	1	1	1	4	2000	13	4	13
Singapore	0	0	0	0	0			0	
South Africa	0	1	1	1	3	1993	20	3	20
Spain	1	1	0	0	2	1983	30	2	30
Switzerland	0	0	0	0	0			0	
Netherlands	0	0	0	0	0			0	
Turkey	2	5	1	1	9	2001	12	9	12
United Kingdom	1	0	0	0	1	2007	6	1	6
United States	2	0	0	0	2	2007	6	2	6

Table A3: Effect of past financial crises on interpretation and measures

Number of past financial crisis of any sort since 1970		No crisis since 1970	1 to 4 crises	5 to 8 crises	Over 8 past crises
Implemented	Measures	0.37	0.29	0.17	0.56
	Recruit	0.20	0.07	0.00	0.00
	Training	0.13	0.11	0.00	0.67
	Organisation	0.07	0.07	0.00	0.11
	Monitoring	0.00	0.00	0.00	0.00
	Regulator	0.00	0.00	0.00	0.00
	Law	0.00	0.00	0.00	0.00
	Guidelines	0.07	0.14	0.17	0.22
	Other	0.37	0.29	0.17	0.56
Proposed	Measures	0.07	0.14	0.17	0.22
	Recruitment	0.07	0.07	0.00	0.11
	Monitoring	0.20	0.07	0.00	0.11
	Regulator	0.00	0.00	0.00	0.00
	Law	0.00	0.11	0.00	0.22
	Guidelines	0.03	0.07	0.17	0.00
	Other	0.00	0.00	0.00	0.00
Years since last financial crisis of any sort (from 1970 onwards)		No crisis since 1970	1 to 10 years	11 to 20 years	Over 20 years
Measures		0.37	0.44	0.29	0.33
Recruit		0.20	0.11	0.00	0.17
Training		0.13	0.44	0.11	0.33
Organisation		0.07	0.11	0.07	0.00
Monitoring		0.00	0.00	0.00	0.00
Regulator		0.00	0.00	0.00	0.00
Law		0.00	0.00	0.00	0.00
Guidelines		0.07	0.33	0.14	0.00
Other		0.37	0.44	0.29	0.33
Measures		0.07	0.33	0.14	0.00
Recruitment		0.07	0.11	0.07	0.00
Monitoring		0.20	0.00	0.11	0.00
Regulator		0.00	0.00	0.00	0.00
Law		0.00	0.00	0.18	0.00
Guidelines		0.03	0.00	0.11	0.00
Other		0.00	0.00	0.00	0.00

Table A4: Forms of legal system adopted by the responding nations.

English-origin	French-origin	German-origin	Other
Australia	Argentina	Germany	China
Canada	Brazil	Japan	Russia
Hong Kong	France	Korea	Saudi Arabia
India	Indonesia	Switzerland	
Singapore	Mexico		
South Africa	Italy		
United Kingdom	Spain		
United States	Netherlands		
	Turkey		