

ISSUESNOTE

Regulation, Governance, Behavioral Economics and the Human Brain

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1.0 Introduction

Over the past ten years, the author of this Issues Note and his many co-authors and colleagues with Delsys Research and other organizations have been conducting research and consulting studies on whether, why, and how behavioral economics, neuroeconomics, and other less conventional economics literatures can be applied to improve the design, administration, enforcement and performance of competition, consumer protection, product safety, environmental, and other policies, laws and regulations of government.

In a previous Issues Note now on the Delsys website, the author of this Note together with Eric Milligan reviewed the work that they have been conducting for the Office of Consumers Affairs, Industry Canada, and other organizations on behavioral economics and the consumer. This earlier note is found at file:///C:/Users/Derek/Downloads/Consumer_Behaviour.pdf

The current document expands on the previous Note through applying behavioral economics and related literatures to a broader range of regulatory actors, contexts and regimes. This research program attempts to bring together and place in a regulatory context the economic ideas, insights, inferences, complementary and interactive aspects, and similarities and differences in predictions and outcomes, from the many overlapping literatures that question the relevance and predictions of the conventional neoclassical, law and economics and industrial organization models based on the rational agent model.

While behavioral economics and related literatures have been making some inroads over the past decade, these more conventional literatures continue to provide the foundations for competition policy, law and jurisprudence and many other regulatory regimes. Greatest attention in this document is given to the insights and inferences from behavioral economics, neuroeconomics and neuroscience; but the links with recent advances in information, institutional, innovation, evolutionary, and regulatory economics, economic sociology, and related literatures that apply behavioral insights are also important to our approach and methodology.

Section 2.0 of this document summarizes some of the major insights and lessons from the behavioral economics, neuroeconomics, and neuroscience literatures that are most relevant to regulatory regimes and actors. Section 3.0 explores in greater detail how our behavioral attributes and cognitive functions influence regulatory regimes, actors, compliance and performance.

The document and our research and working papers on regulation, behaviour and the human brain have identified eight cross-cutting issues that need to be explored in greater detail in future research that applies behavioral economics, neuroeconomics and neuroscience to regulatory actors and regimes. These eight issues are summarized in section 4.0.

The final section of this Note provides some thoughts on how the interactions between complex regulatory regimes and the complex human brain influence the regulatory conduct and decisions of individuals, regulatory authorities, regulated entities and other regulatory actors and stakeholders, and regulatory performance and outcomes. The Note concludes with Exhibit II, which provides a conceptual schematic of the implications of system 1 and 2 of the human brain for regulatory conduct, compliance, decisions, outcomes and performance

2.0 Some of the Major Behavioral Economics and Neuroeconomics Insights and Lessons for Regulation

2.1 Apply BE Insights Broadly to All Market Participants

All individuals, companies, organizations and other economic agents are boundedly rational but willing to learn from their mistakes, successes and experience. Therefore, regulatory authorities should apply behavioral economics and neuroeconomics to the conduct of all market participants that are relevant to a compliance matter, enforcement case or policy issue, including to their own preferences, information and cognitive limitations, behavioral biases, heuristics, and emotional responses to situations.

Furthermore, bounded rationality should be defined broadly to encompass the attributes and constraints associated with information, attention span, cognition, time, effort, energy, interest, willpower, emotion and all other attributes and potential impediments that affect our conduct and decisions – including the many interactive and cumulative effects that result from these attributes and constraints.

Companies and other organizations, including regulatory authorities, may often have some information, knowledge, behavioral, negotiation, and other advantages over individual consumers, voters and citizens, because of “the collective experience and

wisdom of their high-priced talent” and the debiasing and learning effects and benefits that result from the day-to-day interactions between employees that take place within organizations.

This is particularly true when companies and other organizations are in a position to exploit their market power, superior capabilities, political and business connections, and information, knowledge, negotiating position, and other advantages – including their superior knowledge of relevant regulations and regulatory regimes.

However, organizations have their own quite distinct collective biases, flawed heuristics and information challenges, as captured in such behavioral concepts as:

- (i) groupthink, peer pressure, herding and follow-the-leader effects,
- (ii) “functional stupidity” and the curse of superior knowledge and expertise, which impede their ability to respond to new opportunities, challenges and threats and to relate to the needs of final consumers, business customers and other market participants, and
- (iii) the influence and power of overconfident and at times unethical senior executives who suffer from reference group neglect and the illusion of control, competence and “superior foresight and other capabilities,” and delegate the dirty non-compliance work to subordinates.

In many ways, the behavior and decision-making capabilities and flaws of organizations are simply extensions of the behavioral and related strengths and weaknesses of their senior executives and other influential employees.

2.2 More Realistic Inferences and Understandable Findings and Predictions

In many market, social and other contexts, behavioral economics, neuroeconomics and related literatures often provide us with a better approximation of the real world preferences, incentives, motivations, conduct and decisions of market participants compared with more conventional microeconomic, industrial organization, law and economics and regulatory economics theories and models based on the “fully rational, informed, self-interested, and under control rational agent model” of conventional economics.

Compared with the new and highly sophisticated industrial organization and related theories and models developed over the past three decades which often generate conflicting and counterintuitive results and predictions, the inferences and insights from behavioral economics, neuroeconomics and related literatures are often easier to understand and apply by lay people including consumers, business people and competition and other regulatory decision-makers and authorities (judges, commissioners, officials, lawyers etc.) with limited economics backgrounds and expertise. Furthermore, in some market, industry, regulatory, and institutional contexts, these inferences and insights can help to simplify competition, market and regulatory analysis.

2.3 Not a Replacement for More Conventional Economics Literatures

Nonetheless, behavioral economics, neuroeconomics and other less conventional literatures are not replacements for the more conventional economics, regulatory and business strategy literatures, including industrial organization, regulatory economics, and law and economics, which are now being applied by regulatory authorities, regulated populations, civil society groups, and other stakeholders.

Instead, behavioral economics and related literatures should be used selectively on an as needed basis in order to: enhance the design and implementation of policies, laws, regulations and programs; improve the efficiency and effectiveness of the outreach, monitoring/detect, case selection, enforcement response, information and evidence collection and analysis, and other functions of regulatory authorities; and reduce the risk of regulatory errors including:

- (i) Type I errors/false positives e.g. prohibiting an efficiency enhancing merger, safe and innovative product, or new and beneficial technology and project.
- (ii) Type II errors/false negatives: approving an anticompetitive merger, unsafe product, abusive business practice, or socially undesirable technology and investment project.
- (iii) Related regulatory errors that result from regulatory capture, and/or misplaced confidence and trust in well-established incumbent companies, other regulated entities, more experienced regulatory authorities in other jurisdictions, and other stakeholders.

2.4 Confirms Validity and Importance of Many Key Concepts in Conventional Economics

Behavioral economics and the related literatures on neuroeconomics and neuroscience provide support for and increase our understanding of many of the key concepts of more conventional economics. These include:

- the high quality information, signals and incentives provided by reasonably competitive and contestable markets – resulting in market outcomes that are often (but not always) reasonably efficient, satisfactory and fair;
- why, when and how market failures take place; what governments, their regulatory authorities and other regulatory actors can do to address and help to remedy market failures; and when regulators should step aside and allow market forces to correct the failure;
- the utility function, profit, income, utility etc. maximization, the pleasure/pain principle of Jeremy Bentham, and the influence of these concepts on decision making and learning;
- the various regions of the human brain that are activated when we are placing values on and computing our willingness to pay for a good or service, including our willingness to pay for a public good such as clean air and water and reductions in greenhouse gas emissions;
- the “addictive” power of money and the importance of financial and non-financial incentives, payoffs and rewards to the regulatory and other decisions of regulatees and other regulatory actors;
- the often even greater influence of anticipated and actual losses, risks, complexity, ambiguity, and punishments – and our efforts to avoid these and other aversive outcomes – on the preferences, conduct, decisions and learning of individuals and organizations;
- how the human brain interprets and processes information on incentives, rewards, gains and losses;
- computes and compares the values we place on goods, services, investments and other tangible and intangible “objects”;

- and uses these computations and comparisons to assess decision options and choices and make market, economic, social, regulatory and other decisions;
- the comparative benefits and costs of compliance versus non-compliance from the perspective of regulated entities, other regulatory actors, and the economy and society; and
- resource scarcity and constraints (discussed in subsection 3.5 below).

These and other features of the more conventional microeconomics, law and economics and regulatory economics literatures and models make important contributions to the regulatory issues and analysis that are being addressed in the working papers and the longer term research program of the author and his many co-authors and colleagues at Delsys Research and other organizations.

Applying the behavioral, neuroscience and related literatures also provides insights on:

- why large and sustainable financial, network, status, reputational, identity and related payoffs from individual transactions and longer-term contractual and other arrangements between two or more independent companies are vitally important to the success of a transaction and arrangement;
- and why large and sustainable payoffs may also be a potential marker of coordinated conduct and related forms of anticompetitive, non-compliant and unethical conduct; which are intended to abuse the firms’ market power and intellectual property rights, and exploit the informational, behavioral and other disadvantages of their final consumers, business and supply chain partners, competitors and other market participants.

The insights from behavioral economics and neuroeconomics on the addictive power of money and its interactions with corporate size, status, reputation, self-identity and other non-financial payoffs are therefore broadly consistent with the concerns in more conventional industrial organization, regulatory economics, and law and economics literatures regarding the cause-and-effect relationships between market concentration, market, economic, financial and political power, anticompetitive and non-compliant conduct, and super-competitive profits for companies and their shareholders and very attractive compensation packages for their senior executives.

Rather than efficiencies, superior competitive performance, and better serving their customers, the addictive power of money – when combined with anticipated and actual financial and non-financial payoffs that are exceptionally large and apparently sustainable – may be the major driver of many questionable mergers and acquisitions, strategies of monopolization and dominance, and other anticompetitive and non-compliant conduct and strategies of regulatees.

At the very least, the addictive power of money and high anticipated and actual payoffs may provide support for the “rebuttable structural presumption” in merger review and other rule of reason competition law cases, and the tendency and so-called bias of competition and other regulatory authorities and their officials to presume a positive relationship between regulatee size, market concentration, high payoffs and non-compliance.

The major difference with the rational agent model of conventional economics is that behavioral economics and neuroeconomics substantially increase the number and range of incentives to be investigated. As a result, the utility functions of regulated entities and other regulatory and economic actors are explicitly expanded to encompass not only pecuniary (monetary) gains, losses and penalties but as well non-pecuniary (largely behavioral, emotional and psychological) considerations that can complement or conflict with monetary gains and losses and add to or diminish an individual’s and organization’s utility, sense of well-being and performance.

2.5 ... Including the Importance of Scarcity

Resource scarcity and the imperative to economize on the use of scarce resources are powerful concepts in behavioral economics and neuroeconomics as well as the more conventional economics literatures. However, the scarce resources to be accumulated and used wisely and efficiently in behavioral economics and neuroeconomics go beyond financial, physical, natural, intellectual property, and information resources and capital to include: time, energy, interest, self-control, willpower, and attention span; professional intuitions and instincts, cognitive resources and capabilities, and strategic thinking; and social, relationship, reputational, and other forms of intangible capital.

The scarce resources emphasized in behavioral economics, neuroeconomics and related literatures are taking on even greater importance in national and global innovation and knowledge-based markets, industries and economies that encompass:

- (i) ever more complex technologies, goods and services, contracts, markets, business relationships, and corporate entities; and,
- (ii) regulatory regimes that are expanding in number and complexity; are increasingly interconnected at the global scale; and encompass regulatory authorities, regulated entities and other regulatory actors with diverse interests, incentives, motivations, goals, and experience in the more advanced OECD economies as well as a growing number of emerging markets and developing economies.

2.6 ... The True and Full Opportunity Costs of Non-Compliance

Some of the insights from the behavioral economics, neuroeconomics and related literatures that are most important to regulatory compliance and performance and the regulatory compliance paradox are the related concepts of cognitive resource scarcity, cognitive strain, burden and overload, and how fear, anxiety, stress can impair cognitive functioning and decision-making.

These concepts better capture the true and full opportunity costs of non-compliance for regulated entities and the total economy and society – which go far beyond the fines and other punishments imposed on regulatees and the regulatory harms that result from non-compliance. For regulated entities, the true and full opportunity costs of non-compliance can also include:

- misallocation of the regulatees’ scarce time, effort, attention span and cognitive resources and capabilities;
- regulatee anxiety, stress, identity threats and conflicts, and cognitive strain and dissonance that are associated with non-compliant and unethical conduct – which can impair and distort decision making on other priority corporate functions especially when non-compliant and unethical conduct has a “contagion effect” throughout the organization – especially when regulated entities and their senior executives and other employees are otherwise fair, trustworthy, respectable and law

abiding organizations and individuals or at least perceive that they have these positive attributes;

- the more information, analysis, attention span, and cognition intensive nature of non-compliance versus compliance strategies;
- responding to and protecting the regulated entity from the greater scrutiny by and more severe punishments from more suspicious and emotionally driven regulatory authorities, final consumers, business customers and partners, media, civil society groups, and other stakeholders;
- and the foregone opportunities and benefits that would otherwise have emerged from employing competitive, compliant, ethical and social responsibility strategies, which are well documented in the regulatory, business management, behavioral and other literatures.

Behavioral economics, neuroeconomics and related less conventional literatures also provide important insights on how and why resource scarcity in terms of time, money, self-confidence, and cognitive and other assets have much greater and more negative impacts on the well-being, thinking, purchasing and other conduct and decisions of low-income consumers and households compared with more prosperous consumers and households.

Purchasing errors that are seen as trivial by higher income consumers can have substantial consequences for the well-being of lower income consumers and their families. These and related pressures increase their sense of vulnerability, disadvantage and fear when making purchases and conducting other market transactions – which then add to the “true and full” opportunity costs of non-compliance to the economy and society, when producers, retailers and vendors exploit the vulnerability, disadvantages and fears of lower income consumers.

2.7 ... And the Importance of Pleasure, Utility, the Power of Money and Other Incentives and Motivations

As noted earlier, behavioral economics, neuroeconomics and neuroscience confirm the importance and increases our understanding of utility, financial and non-financial rewards and the pleasure/pain principle of Jeremy Bentham. At the same time, these literatures illustrate that the regions of the human brain that process information on incentives and rewards, called the reward circuitry, are much

more complex and respond to a much broader range of stimuli, than presumed in more conventional economics that focuses largely on financial incentives and rewards.

In particular, behavioral economics, neuroeconomics, and neuroscience illustrate that: (i) the pleasure and utility experienced by individuals have many sources; (iii) the information and other stimuli on these various sources of pleasure and utility are processed in the same parts of the human brain; and therefore (iii) there are important interactive, cumulative, and feedback effects between financial and non-financial rewards and incentives that could be relevant to regulatory functions, compliance and performance.

Individuals receive satisfaction, pleasure, and utility from:

- Anticipated and actual monetary rewards especially rewards that are considered to be earned because of strong performance, are larger than expected, and are larger than the rewards received by others.

These monetary rewards can work together to add to the “addictive power of money” when financial rewards have very strong emotional and cognitive resonance and weight; but as well can be used by regulators to make the extrinsic rewards and incentives from compliance more effective and more likely to reinforce and “crowd-in” the intrinsic incentives and motivations to comply of regulated entities.

- Reputation, status, identity and other ethical, moral and “social” rewards from doing the right thing and being seen by others to be doing the right thing.
- And acts of pure altruism and charity including: contributing to the public good through for example: complying with laws, regulations and social norms, compliance that goes beyond the formal regulatory requirements and obligations, and “altruistic punishments” of free-riders and other wrong-doers that are more severe than would be predicted by conventional economics and the rational agent model.
- The control and autonomy we have over our work and from conducting and successfully completing interesting tasks that display and confirm to ourselves and others our expertise and competence.
- Working with people (and by extension companies and other organizations) who are cooperative, fair, ethical, trusting, and loyal, and have reputations as

trustworthy reciprocators of the cooperation and trust of other people – which can make extrinsic rewards and incentives even more effective and can further reinforce and crowd in intrinsic rewards and incentives to comply.

- “Sweet revenge” and punishing free-riders, non-cooperators and other wrongdoers, who treat us unfairly, violate our trust, take advantage of us, and cause harm to the individual and other people;

which includes the pleasure we receive from “schadenfreude” and related emotional responses when the “betrayal of our trust” is duly punished by a court, regulatory authority, final consumers or other regulatory actors.

- Avoiding losses, risks, ambiguous situations, decisions that would be regretted later, and other aversive situations and outcomes and sources of “pain”.
- Being smarter than the regulator as well as customers, final consumers, suppliers and competitors (who are ridiculed as “suckers” for complying); pushing the regulatory envelope and gaming the regulatory system.

Finding legal and regulatory gaps and loopholes to be manipulated and exploited; capitalizing on the information, behavioral, cognitive and other disadvantages of competitors, suppliers, business customers, vulnerable and other consumers, and regulatory authorities.

And experiencing pleasure from the anticipated and actual financial and non-financial rewards from non-compliance – with little perceived risk of detection and punishment because the “overconfident miscreant” company is so much smarter than all of the other economic and regulatory actors, has perfect foresight, and has full control over the regulatory environment and the other regulatory actors.

Regulatory authorities and other regulatory actors and their economic, legal, social responsibility, ethics and other advisors need to develop a better understanding of these different sources of pleasure and utility, the positive and negative interactions between them and their implications for regulatory compliance and performance, and how the reward circuitry in the human brain resolves the conflicts and trade-offs between these different sources of pleasure, which can favour either compliance or non-compliance depending on the individual, organization, and market, economic, social and regulatory context.

These insights can then be used in:

- Designing policies, laws, regulations and rules by governments and their regulatory ministries and agencies.
- Designing, implementing and framing the key messages contained in the monitoring, compliance promotion, education, outreach, enforcement response, sanctioning and deterrence, and other regulatory functions and strategies of regulatory authorities.
- Assisting regulatory authorities and other non-regulated entities to decide whether substantial monetary fines and other severe penalties, voluntary compliance actions by regulatees and other lighter touch nudges, or enforcement responses between these two extremes represent the most effective extrinsic incentives to comply (see the discussion of the regulatory compliance/non-compliance continuum later in this Issues Note and in Exhibit I).
- The design, implementation and monitoring of voluntary compliance action plans and strategies by the corporate units that are responsible for compliance, corporate ethics, and social responsibility within regulated companies and other organizations – which require considerable “corporate self-awareness” of the emotional, instinctive, intuitive, cognitive and moral reasoning, strategic thinking and related cognitive strengths and weakness of the regulated entity.
- And the design and implementation of the compliance promotion, naming and shaming, and related initiatives of consumers associations, environmental non-government organizations and other civil society groups;

Better understanding of these insights from the behavioral and neuroscience literatures on the different sources of pleasure and utility would assist all regulatory actors to find and implement better methods and instruments, in order to: (i) encourage compliance and ethical conduct by regulated entities, (ii) reward the compliant and harm the non-compliant, and (iii) improve the effectiveness of the laws, regulations, rules, programs, and other functions that are administered by regulatory authorities.

Insights from the behavioral and neuroscience literatures would especially assist regulators and other regulatory actors to design and implement these initiatives and instruments in a manner that:

- (i) enhances the extrinsic (external), intrinsic (internal to the individual and organization), and image and reputation based incentives and motivations to comply of regulatees;
- (ii) better ensures that punishments and other more negative external incentives and motivations complement and “crowd-in” the more positive intrinsic incentives and motivations to comply; and,
- (iii) identifies and promotes situations, contexts, incentives and motivations where monetary and non-monetary/social rewards are complements;

such as when regulatees perceive the financial rewards of compliance, and the social and “psychic” rewards, utility and pleasure from cooperating with regulators and other regulatory actors and contributing to the public good of regulatory compliance, performance and outcomes, in a more interactive, cumulative, beneficial and rewarding manner.

In sum, governments and their regulatory authorities and other non-regulated actors need to learn how to strategically employ these insights in order to design, implement and “frame” their various instruments, programs and messages in a manner that helps to build a sustainable compliance culture within regulated entities and across the entire regulatory regime – whereby compliance, ethical conduct and social responsibility become conventional, routine and the default option for most or all regulated entities.

2.8 Social Cognition and Rewards, the Social Brain, and Principles-Based Polycentric Regulatory Models

Recent advances in social neuroscience on social cognition and the “social brain”, intergroup relations, within group loyalty, social identification, and the “insider versus outsider” perspective, suggest that compliance as the default option can be strengthened and become further embedded within a regulated company, supply chain, business group, network or ecosystem or a regulated industry when compliance is supported by a principles-based and polycentric multiple stakeholder regulatory model.

Under a principles-based polycentric regulatory regime, shared information and learning, shared mental models regarding why compliance is important and how compliance can be achieved, and shared responsibilities for compliance would establish and

nurture strong within group loyalties, an insider perspective and a shared recognition that industry and regime reputation for compliance is a common-pool resource that benefits all members.

Through employing a shared responsibility approach instead of the more conventional stakeholder and principal-agent regulatory approach, a polycentric regulatory regime would have a positive influence on the pro-compliance preferences, conduct and decisions of all regulatory actors: the regulatory authorities, regulatees, consumers, other market and supply chain participants, industry, trade and professional associations, and civil society groups within the regulatory regime and system.

The social neuroscience and new institutional economics literatures suggest that strong identification by regulatees and their employees with an “insider group regulatory regime” for which compliance is routine, conventional and the default option: (i) would build pro-compliance empathy, social norms, other-regarding preferences, and informal rules of business conduct within the regime; and (ii) would promote self-regulation across regulated entities and punishment of non-cooperators and free-riders that do not comply, betray the confidence and trust of other insiders, and cause harm to the insider group and to others.

As noted above, because of insider group norms and dynamics, these punishments often would be more severe than would be predicted by the rational and self-interested agent model of conventional economics.

2.9 Behavioral Economics and Related Literatures Often Support Chicago School Perspectives and Arguments

As noted earlier, the insights from behavioral economics and neuroeconomics: extend the concept of the boundedly rational but willing to learn economic actor to all regulatory actors and market participants; and the concept of scarcity to the time, energy, attention span, willpower, professional intuitions and instincts, and cognitive resources of all regulatory actors including governments and their regulatory authorities.

Extending these insights and concepts in this manner can be used to strengthen many of the arguments of the Chicago School and other more conservative competition law and other regulatory practitioners. In particular, these insights support their perspectives that Type I errors (e.g. prohibiting a pro-competitive merger) are more consequential than Type II errors

(e.g. approving an anticompetitive merger). This is because the latter are easier to identify and correct by regulatory authorities, other regulatory actors, market forces, technological and institutional change, and adaptation and learning by consumers, regulators and other economic agents.

As a consequence, behavioral economics and neuroeconomics can be used to demonstrate both the strengths and the limitations to market regulation and other government interventions; and the important contributions of fair competition, normal market forces, and the adaptation, learning and self-awareness of market participants to promoting the just-world beliefs, incentives, motivations, identities, emotional responses, moral instincts and reasoning, and other behavioral attributes that on balance favour regulatory compliance and the achievement of regulatory objectives in many but not all market contexts.

Therefore, regulatory authorities need to develop a stronger understanding of the behavioral and related attributes of their regulated populations, as well as a stronger understanding of their regulatory, market, economic and social contexts, which influence and to an important degree determine their behaviour, choices, decisions, self-awareness and learning.

Neuroeconomics and neuroscience also provide insights on risk, ambiguity, learning, valuation, choices and decision making, which are broadly consistent with and increase our understanding of how more conventional economic literatures address such normative considerations as learned optimal choice in contexts characterized by risk and uncertainty.

2.10 ... And Further Explains Why Compliance Can Go Beyond Regulatory Requirements

One of the more powerful insights from the behavioral, neuroscience, institutional and related literatures is that in some market, social, community and other contexts, compliance with laws, regulations, rules, and social and ethical norms, and contributions to public goods and the management of common-pool resources can “go beyond the rational”.

Therefore, compliance can exceed the predictions of rational agent model based on the perfectly informed, rational, and self-interested economic actor who carefully weighs the financial benefits and costs of compliance versus non-compliance when developing preferences, evaluating choices and making decisions.

Compliance that exceeds regulatory obligations, duties and requirements is especially prominent when compliance is a major component of corporate social responsibility programs that are incorporated into the accountability frameworks of boards of directors, senior executives and other managers of companies, other regulated entities, and other organizations.

As noted earlier, the same literatures on our preferences for fairness and aversions to betrayal of trust also indicate that, in some contexts, the emotional, instinctive and cognitive responses of individuals, companies and other organizations to unfair, uncooperative and non-compliant conduct and betrayals of trust will encompass punishments that are so severe that they also go beyond the rational and narrow self-interest of the punisher. This is particularly true when the conduct of others and its negative consequences result in a sense of betrayal, moral indignation, and moral outrage.

In most contexts, these responses and punishments will favour regulatory compliance and performance, but the same moral indignation and outrage and over-reactions to the uncooperative and free-riding behaviour of others can also help to sustain and entrench cartels, collusion, bid-rigging, criminal conspiracies, joint dominance, and other coordinated non-compliant conduct and arrangements across individuals, companies and other organizations – leading to greater incidence of repeat offenses and recidivism despite actual and future fines and other punishments by regulatory authorities and other regulatory actors.

This situation points out the importance of context to regulatory performance and compliance and to how these less conventional literatures should be interpreted in order to better understand why compliance is the norm and default option in some contexts and non-compliance is the default in others. The same and similar information challenges, behavioral biases, heuristics, emotional responses, cognitive functions and other behavioral attributes that support compliance and regulatory objectives in one context can support non-compliance and regulatory harm in another context.

3.0 Behaviour, the Human Brain, and Regulatory Compliance and Performance

3.1 Role and Importance of Systems 1 and 2 of the Human Brain to Regulatory Actors and their Preferences, Conduct and Decisions

As implied in the previous sub-section, this and other working papers of the author and his colleagues are directly or indirectly employing the system 1 versus system 2 method, “paradigm”, generalization and “thinking fast and slow” short-hand of Nobel Prize Winner Daniel Kahneman and his colleagues. This generalization compares:

- (i) our emotions, perceptions, professional, expert and other intuitions, moral and other instincts, related thoughts and preferences that come easily to mind with little reflection and effort, and other more effortless, unconscious, automatic and habitual system 1 attributes and regions of the human brain;
- (ii) with our cognitive and moral reasoning, rational calculation, deliberation, strategic thinking, and other system 2 attributes and regions of the brain – which require more time and effort, are more rule governed, and are not always reliable and available to question and correct our system 1 heuristics, emotions, intuitions, instincts and mistakes.

The dual thinking fast and slow system of Kahneman explores as well the interactions, overlaps, competition and conflicts between the two systems whereby, for example, system 2 at times but not always corrects the system 1 emotional responses and flawed intuitions and heuristics. And at other times and contexts, the system 1 emotions, instincts and intuitions influence our cognitive and moral reasoning and act as an early warning system for the cognitive functions in system 2 in order to better ensure that, when there is a highly arousing and emotional event, this event receives priority attention by our cognitive and moral reasoning and related system 2 resources.

Descartes and his followers in economics, political science and other social sciences have contended for more than two centuries that one of the main jobs of the reasoning and cognitive resources in system 2 is to override and correct the passions, emotions and flawed intuitions, instincts and heuristics of

system 1. In contrast, the insights from recent advances in behavioral economics, neuroeconomics and neuroscience suggest that the emotions, expert, professional and other intuitions, moral and other instincts, fast and frugal heuristics and other attributes of system 1 can and often do make a positive contribution to the preferences, conduct, decisions and learning of for example regulatory authorities, regulated entities and other regulatory and economic actors.

The professional intuitions, moral instincts, and accumulated experience stored in the associative memory of their officials allow regulatory authorities to respond more quickly to a major regulatory threat. The moral instincts and related emotions, intuitions, perceptions, beliefs and fears of regulated entities and their officials generate many of the intrinsic incentives and motivations to comply with laws, regulations and social norms.

The moral indignation and outrage and related emotions and passions of actual and potential victims of regulatory misconduct, and other individuals who feel empathy and sympathy for these victims, can result in substantive and rapid market responses and punishments of wrong-doers, which can reduce or eliminate the need for investigation and enforcement response by regulators.

Civil society groups can:

- bring together and augment the moral indignation and outrage of its members and other potential and actual victims,
- add their information, learning, experience and technical expertise to provide a more credible and “rational” argument to regulators and regulatees, and
- use social media and related availability cascades to greatly increase the pressure on misbehaving regulated entities to comply.

In short, the emotions, professional intuitions and gut feelings of regulatory actors, as well as their self-awareness of and self-control over their emotions and passions, can improve decision making and contribute to regulatory compliance and performance. Some other examples of system 1 contributions are provided in the rest of this document.

3.2 Anticipated and Actual Gains, Losses, Risks, Ambiguity and Current versus Future Rewards

While behavioral economics, neuroeconomics and related literatures provide support for many of the major premises of more conventional economic literatures, these less conventional literatures also indicate the limitations of the rational agent and choice model based on perfect information, rationality, cognition, self-interest and self-control. The limitations of the conventional literatures include why and when the rational agent model cannot fully explain:

- (i) some individuals and regulated entities normally comply and others do not,
- (ii) and still others comply on a more contingent and contextual (it depends) basis,
- (iii) the serious regulatory incidents and disasters of the past three plus decades, and
- (iv) the regulatory compliance paradox which is the subject of one of the working papers of the author of this Issues Note.

For example, recent advances in behavioral economics, neuroeconomics and neuroscience indicate that:

- 1) Anticipated rewards, gains, losses and punishments have as much if not more influence on the preferences, behavior and decisions of regulatory actors as the rewards, gains, losses and punishments that are actually experienced.

Monitoring, compliance promotion, enforcement response, sanctioning and other regulatory functions and messages should give some attention and priority to the anticipated rewards, gains and benefits from compliance; and the expected losses, costs and punishments from non-compliance – in order to increase the salience and immediacy of the aversive outcomes and associated pain, fear, foreboding, identity threats, cognitive dissonance, and other sources and forms of disutility that are associated with non-compliant, unethical and socially irresponsible corporate conduct.

- 2) Anticipated and actual losses when combined with aversions to losses, risk, ambiguity, uncertainty, regret and disappointment, and the efforts we make to avoid the “pain” of aversive outcomes, may carry greater emotional and cognitive weight compared with anticipated and actual gains, our preferences

and other situations and events that give us pleasure.

- 3) Because of reference points, reference dependent preferences, the endowment effect, and related behavioral biases and traits, individuals and by extension organizations respond more to relative values (increases or decreases in wealth, incomes, sales, profits etc.) compared with absolute values in the same indicators.

Therefore, when compared with information on their current status and position, they respond more to information and events that have increased, can increase, or will increase or decrease their wealth, income, performance, status and overall well-being. They also respond more to information and events that compare their wealth, income, performance and overall well-being to the same indicators for other individuals and organizations.

This is because, compared with absolute values, changes in relative position are easier to recall, carry greater emotional and cognitive weight, and therefore have greater influence on choices and decision making. This is consistent with the general principles of prospect theory whereby: (i) information on changes are more accessible and understandable to the individual than information on absolute values such as on our aggregate wealth and financial assets; and (ii) more accessible and salient values, information, and events, which are easier to recall, imagine and contemplate, are given much greater weight when individuals are making choices and decisions.

Because the human brain uses and depends on reference points and the immediacy and salience of the available information, which can vary depending on context and situation, for example:

- whether the individual is buying or selling something,
- is comparing her or his income with last year’s income or with the income of a colleague,
- or is comparing the potential payoffs from a non-compliance strategy versus the payoffs, including the risks, losses and other aversive outcomes that are avoided, from compliance (see the earlier discussion on the true and full opportunity costs of non-compliance);

the values we place on tangible or intangible objects and the decisions we make based on

those valuations can vary greatly depending on economic, market, corporate, social, regulatory or other context, the individual, and/or the mood of the individual at the time that the valuation and decision are being made. For example, the senior executives of regulated entities are more likely to select the non-compliance option if their more recent interactions with the regulatory authority have resulted in outcomes that the senior executives deem to be unfair and inconsistent with due process because e.g. penalties are considered to be disproportionate and overly severe.

- 4) As noted earlier, the various sources of and information on pleasure and utility that are actually experienced are processed in the same regions of the human brain called the reward circuitry. However, when compared with immediate rewards, future rewards are processed in different regions of the brain – leading to myopia, short-termism, time-inconsistent preferences and hyperbolic discounting, preferences for immediate gratification, consumption, and financial payoffs over saving now to support future consumption and well-being, and other problems with intertemporal choices and decisions.
- 5) Compared with risk, which has known or at least knowable probabilities and consequences, situations characterized by ambiguity, uncertainty and limited information on risk, probabilities and outcomes, result in stronger system 1 emotional reactions in the human brain.

As a consequence the aversions to uncertainty and ambiguity are greater than the aversion to risk; and people are more likely to avoid making decisions – and make mistakes when decisions are made – when information on risk and probabilities is incomplete and the context or situation is perceived to be complex, uncertain, ambiguous, unpredictable and threatening.

- 6) Loss and risk aversion appear to be conceptually similar but in fact can operate in opposite directions in ways that are important to regulatory compliance, outcomes and performance.

This is because, as noted earlier, context, reference points, and reference dependent preferences are important to how individuals and by extension companies and other organizations evaluate and respond to risk, uncertainty, losses and gains.

For example, regulated entities that are facing

significant financial and other losses will often have a strong appetite for risk; while regulated entities that are experiencing financial and other gains of similar absolute value will be more satisfied with their current financial performance/reference point (see point 3 above), more cautious and risk averse and therefore more likely to comply with laws, regulations and social norms.

In short, other things being equal, the frequency and consequences of non-compliance may be greater for companies, industries and technologies that are on the downward side of their life-cycle and are experiencing weak financial performance, financial distress and a strong possibility of business failure and exit. Fighting for survival to stay in the game generates both incentives and justifications for high risk and reckless conduct and decisions that place little weight on ethics, morality, social responsibility, compliance with laws, regulations and social norms, and the longer-term future.

- 7) Information on financial and non-financial rewards are processed and interpreted with little thought and effort in the system 1 region of the brain. In sharp contrast, calculating, understanding, “processing” and using probabilities require substantial time, effort, attention span, and system 2 cognitive resources, which are in short supply and at times are not available and functioning.

This is particularly true when the probabilities are also uncertain and ambiguous, leading to an “aversion” towards probabilities, which would be added to and would compound the aversion to risk.

Moreover, how individuals assess and interpret probabilities can depend on emotions, framing, priming, cues and contexts. These and other emotional, behavioral and cognitive constraints can often lead to decision errors and non-compliant and unethical conduct – especially when the anticipated and actual rewards and payoffs are very high and predicted to remain high for a long period of time, and the addictive power of money is very strong and is dominating decision making.

Under these circumstances, the system 2 cognitive functions that process information on risk, uncertainty, ambiguity, probabilities and the possibility that the good times may come to an end are either not functioning or their warning signals are ignored by the individual and his or her company or other organization.

The literature reviewed in the working papers and related research of the author and his colleagues suggests that these decision making and cognitive failures were prominent in and help to explain the collapse of the American subprime mortgage market, the subsequent global financial crises, the earlier corporate governance scandals, and other regulatory non-compliance incidents and disasters of the past three decades.

- 8) More generally, our preferences, conduct and decisions in many market, regulatory, social and other contexts are influenced more by our emotions, perceptions, expert and other intuitions, moral and other instincts, “rule-of-thumb” heuristics, and ideas, thoughts, preferences, judgments, and choices, which come easily to mind with little reflection and effort, and other more effortless, unconscious and automatic system 1 attributes and regions of the human brain.

The fast and frugal thinking, processing and responses in system 1 can be compared with our cognitive and moral reasoning, rational calculation and other system 2 attributes and regions of the brain – which require more time and effort, are more norm and rule governed, are in short supply, and are not always reliable and available to question and correct our system 1 intuitions, heuristics and mistakes – especially when individuals are working in situations that involve tight deadlines and considerable excitement, anxiety, stress and fear of failure.

- 9) Furthermore, as market and regulatory environments become increasingly complex, “noisy”, dynamic and interconnected at the global scale, the “fast and frugal” heuristics, thinking and choices of system 1 will take on additional importance for regulatory authorities, regulated entities and other regulatory actors.

For regulated entities that normally comply, this situation will help to further embed compliance, ethical conduct, and social responsibility into their corporate cultures. While for the “villains and bad apples” of the regulatory landscape, the system 1 attributes will help to further entrench non-compliance within the regulatee’s corporate culture; and therefore regulatory authorities will require substantive improvements and additions to their messages, credible threats and compliance promotion, enforcement response and sanctioning instruments to influence and hopefully change their behaviour.

These insights on gains, losses, risk, uncertainty, ambiguity and probabilities, and the complex interactions between them, can provide guidance on how regulatory authorities should design and implement, and use cues, “framing”, “priming”, anchoring, availability, salience and other behavioral effects and techniques in their outreach, education, compliance promotion, enforcement response and deterrence strategies, programs and functions.

For example, while regulatory certainty, predictability and transparency are highly valued by regulatees and other stakeholders, introducing a certain degree of strategic uncertainty, ambiguity and unpredictability into the size of penalties, if and when inspections and related monitoring will take place, the rigour and comprehensiveness of an investigation, and other regulatory functions, can capitalize on these aversions and the regulatees’ fears and other emotional responses to anticipated and actual losses, in order to promote compliance and in some regulatory contexts compliance beyond the regulatory requirements and obligations.

On the more negative side, these insights from the behavioral and neuroscience literatures indicate that the power of money can become an addiction for some companies, other regulated entities and their senior executives and other employees, especially when:

- (i) financial payoffs have been and are extremely high, are well above initial expectations and predictions, are now expected to remain very high, are deemed to be “earned” by recipients because of their “superior effort, acumen and expertise”, and therefore are now perceived as an entitlement, an endowment, the “status quo”, and the “reference point” to guide and dominate future decisions and strategies;
- (ii) the loss of these high financial payoffs and their associated status, reputation and related psychic benefits would be very painful for these individuals and their companies – and therefore even thinking about such an aversive outcome is avoided to the greatest extent possible, and risk managers and other employees who raise such uncomfortable issues and outcomes at meetings are considered to be poor team players;
- (iii) and the fear, foreboding and related negative emotions that most regulatees associate with the risk of detection, investigation and punishment for their non-compliance, are replaced by more positive and pleasant feelings that are associated

with anticipating, conducting and completing high risk, dangerous, challenging, daunting, invigorating, and exciting non-compliance tasks and strategies in pursuit of ever higher financial and non-financial payoffs and rewards.

In these market, economic and regulatory contexts, the “addictive” power of money, when combined with the joy and pleasure from high risk and reckless conduct and successfully gaming the regulatory system, can override the potential risks from non-compliance, moral instincts and reasoning, previous intentions to act in an ethical manner and comply with laws, regulations and social norms, and “sacred beliefs in a free and fair market economy and enterprise system – making non-compliance the dominant paradigm and default option for the “villains and bad apples” of the regulatory landscape.

3.3 Implications for Regulatory Regimes of the Interactions, Competition and Conflicts Between Different Regions of the Human Brain

One of the most important insights from neuroeconomics is that many of the preferences, choices and decisions of regulatory actors involve responding to information and other “stimuli” that activate different parts of the human brain. Depending on the individual and context, information and other stimuli will be processed, interpreted and resolved through the interactions, competition and conflicts:

- (i) between different regions within either system 1 or system 2;
- (ii) and/or between the emotions, intuitions, instincts and perceptions in system 1 and the cognitive and moral reasoning, benefit-cost type calculations and strategic thinking in system 2.

Two over-arching themes and insights that emerge from these complex behavioral and neuroscience literatures on conflicts within the human brain appear to be especially relevant to regulatory actors, contexts and regimes. First, recent insights from social neuroscience on social interaction and cognition, social decision making, and the social brain indicate that, compared with contexts where individuals are acting mainly on their own, preferences, choices and decisions that activate different regions of the human brain are more likely to arise in market, economic, regulatory, social, organizational and other settings where individuals are interacting together and depend on each other for their individual and collective well-

being.

More regions of the human brain are brought into play and more cognitive resources are utilized because social interaction and decision-making require that individuals know: (i) not only their own beliefs, preferences, desires, thoughts, intentions, motivation, strengths, weaknesses, biases, and decision-making abilities; but also (ii) the beliefs, preferences, desires, thoughts, intentions, motivation, biases, honesty, trustworthiness, strengths, weaknesses, biases, and decision-making abilities of other people.

Social situations, interactions and decision making that involve competition and conflict between different regions of the human brain are become more and more prominent in the modern, knowledge-based, global economy, given for example the rapid growth in national and global supply chains, business groups, networks and eco-systems, and other more complex corporate entities comprised of nominally independent companies (see e.g. Rilling and Sanfey 2011).

Second, and more generally, compared with simpler decision contexts, preferences, choices and decisions that involve interactions, competition and conflicts between different regions of the human brain require substantially more attention span and cognitive resources and effort, and are more likely to put the individual into a “bad mood” and to lead to decision error, decision aversion, and decision avoidance. These preferences, choices and decisions that involve interacting and competing regions of the human brain include the following cognitive functions and tasks.

GAINS, LOSSES, RISK AND UNCERTAINTY

- gains versus losses of prospect theory where losses and aversive outcomes carry greater emotional and cognitive weight than gains of equal value;
- anticipated rewards, gains and losses versus actual rewards, gains and losses – where anticipated utility/disutility and pleasure/pain can be as significant and influential on decisions as utility/disutility and pleasure/pain that are actually experienced;
- very large versus very small rewards, payoffs and benefits;
- fairness versus financial self-interest when e.g. the financial reward from a transaction or other interaction is positive but is considered to be unfair and therefore could be rejected by the potential recipient;

- risky choices and risk-seeking mistakes versus riskless choices and risk-aversion mistakes;
- immediate rewards and gratification versus delayed rewards, which will be enjoyed at some point in the (often yet to be determined, uncertain and contingent) future;
- immediate financial payoffs and rewards versus more or less immediate social payoffs and rewards (including avoiding the guilt and other negative feelings that would result from not reciprocating the cooperation, trust, kindness and favours from others) – which in some contexts can be complementary rather than conflicting;
- conflicts in the human brain when choosing between small and likely rewards/gambles versus large but unlikely rewards/gambles;
- today's preferences versus our preferences in the future (which may be very different and even surprising to and unanticipated by the individual);

- size of the reward/payoff versus the risks, probabilities and uncertainties of receiving the reward and of avoiding the aversive outcomes associated with the reward from e.g. non-compliance and unethical conduct;

the regulatee's location on the compliance/non-compliance continuum will play a major role in determining whether the size of the payoff or the anticipated and actual aversive outcomes from non-compliance are more influential (see Exhibit I below);

- financial and non-financial rewards which mainly activate the reward circuitry in system 1 versus the assessment of risk, probabilities, uncertainty and ambiguity which require cognitive processing and calculation in system 2;
- risk versus uncertainty/ambiguity;

both involve fear, dread, foreboding, lack of control as well as hope, excitement, exhilaration and other positive and negative emotions;

but these emotions, and their associated pleasant or unpleasant feelings in the “emotional brain” (see above), are greater for more uncertain/ambiguous situations where the information on probabilities and/or outcomes is incomplete, and individual and organizational control over current and especially future events is even more limited;

- emotional system 1 responses to risk, probabilities, uncertainty and ambiguity versus system 2 cognitive and moral reasoning, benefit-cost type calculations and deliberation;

where the system 2 processing is broadly consistent with the rational agent model and expected utility theory and is more functional and practical rather than “truth seeking” – but for the reasons described elsewhere in this document the system 2 resources may at times not be available;

- the possibility that different regions of the human brain are activated depending on the context/domain of the risk-taking behaviour e.g. recreational, financial, health, social and ethical;

since individuals are not consistently risk averse or risk seeking across all contexts and domains; and attitudes towards risk and uncertainty in a given domain can vary depending on gender, cultural, socioeconomic, and other differences between individuals;

- the possibility that different regions of the human brain are activated depending on whether the risk seeking and risk taking behaviour generates excitement, exhilaration, hope and other more positive emotions e.g. when gambling, buying a lottery ticket, starting a new highly innovative business, or gaming the regulatory system;

or fear, foreboding, stress, anxiety, tension, cognitive dissonance, or other more negative emotions when e.g. an otherwise ethical and law abiding senior executive is negotiating with competitors to establish a cartel, bid-rigging or other collusive or joint dominance arrangement.

SOCIAL PREFERENCES AND REWARDS AND THE “SOCIAL BRAIN”

- the current preferences of individuals and society versus the preferences of future generations;
- social rewards: the pleasure, utility and benefits from doing and being seen to do the right thing and complying with laws, regulations and social norms; versus monetary rewards from compliance or non-compliance depending on the firm, market, industry, and other contexts and parameters;
- cooperation, which activates regions of the brain associated with rewards, versus competition, which activates regions associated with the individual's sense of agency and sense of being different and

distinctive which sets her or him apart from other people;

furthermore, compared with more cooperative social decision making and contexts, competitive contexts and decision making lead to greater activation of the regions of the human brain that are associated with strategic thinking, “theory of mind”, and “mentalizing” neural activity; and not surprisingly competitive social behaviour is more often motivated by envy and “schadenfreude” ;

- the emotional and cognitive attributes, responses and biases from interacting with “insiders” versus the attributes, responses and biases from interacting with “outsiders”;

which can promote trust, cooperation, loyalty and compliance with laws, regulations, formal and informal rules and social norms within the “insider group”; can be used and misused to promote, rationalize and justify non-compliant, unethical and anti-social conduct and harm towards “outsiders”;

and can challenge the efforts of regulators and their compliance partners and champions to develop and maintain a regulatory regime where all regulatory actors perceive themselves and all other participants within the regime as “insiders” – with limited “us-versus-them” tendencies and conflicts between different regulatory actors with different interests and backgrounds;

- social perceptions and social cognition that are faster, more automatic, inferential, intuitive, interpretive, and implicit, are domain and context specific and are processed largely but not totally in system 1;

versus social regulation and emotional self-awareness, self-regulation and self-control that are more controlled and effortful and less emotional, are context sensitive, involve cognitive control, monitoring, error correction, self-reflection, strategic behaviour, and deception of others, and largely involve system 2 thinking and processing of information and social stimuli;

- and more generally interactions and conflicts between different system 1 and 2 regions of the “social brain” that are important to establishing and maintaining within group loyalties, identities, cooperation, and “corporate cultures”;

- individualistic games” involving preferences and decisions when the individual is interacting with “other players” who are totally anonymous or with an impersonal “other player” such as a computer or a database on a website;

versus “social games” involving preferences and decisions when the individual is interacting with other players and partners in market, economic, social, regulatory, organizational and other contexts;

- social cognition and the social brain versus the arousal, valence, and core affective properties of the emotional brain – which can be complementary or conflicting, can involve both system 1 and system 2, and are both context and reference dependent;

- social, regulatory and related situations and contexts for which trust, reciprocity of trust, fairness, cooperation and achieving social norms are important and business and other partners meet your initial expectations;

versus similar social, regulatory and related situations and contexts where business and other partners either greatly exceed or are significantly below your expectations regarding trust, reciprocity of trust, fairness, cooperation and social norms;

deviations from expectations in either direction are more memorable and have a greater influence on current and future decision making;

- reinforcement, error-driven, Pavlovian and habitual value learning which largely implicates system 1 versus more goal-directed value learning mainly in system 2;

- social learning, that is, learning from others within social, regulatory and related contexts versus more individualistic learning based more on personal experience;

- social learning from interactions with individuals and organizations of lower reputation, status and rank versus social learning from individuals and organizations of higher reputation, status and rank compared with the individual and organization receiving the information and leaning;

learning from individuals and organizations of higher reputation, status and rank is more likely to be retained and used by and to influence the decisions of lower ranked individuals and organizations – pointing out the importance of

industry leaders to regulatory compliance and performance.

INCENTIVES, MOTIVATION, DECISION MAKING AND LEARNING

- decision making that is more unconscious, automatic and effortless (generally in system 1) versus more complex decision making that is goal oriented, involves social relationships and social interactions, and requires greater self-control and self-regulation (the executive function of the brain generally in system 2);

- incentives and motivation based on “liking something” (“incentive sensitization”) versus incentives and motivation based on “wanting something” (“incentive salience”);

which perhaps could be extended to situations where for example, based on the moral instincts in system 1, an individual would “like” to be a good person and be seen to be doing good things, but as well would “want” to have the pleasure, status and power provided by high income and wealth

whereby the “want” from the addictive power of money can in some contexts dominates the “like” from reputation and self-identity (employing “liking” versus “wanting” based on the more automatic and unconscious system 1 perspective rather than the more cognitive and goal-directed system 2 perspective);

- reinforcement, habitual and other types of learning, motivation, habitual behaviour and the nondeclarative memory system which mainly (but not totally) involve system 1 thinking and information processing; versus more cognitive based learning, goal-directed behaviour, related motivation, and the declarative memory system (including long-term memory for events and episodes referred to as episodic memory);

which largely (but not totally) involve system 2 – and the potential for complex interactions between them when individuals and organizations are functioning within increasingly complex and ambiguous regulatory contexts and systems;

- selfish, self-interested and self-regarding motives and behaviour versus altruistic, fair, cooperative, trusting and other-regarding motives and behaviour;
- choices and decisions that involve efficiency

versus choices and decisions that involve fairness, unfairness and inequity;

- “arousing” positive and negative emotional experiences and events that are more likely to be stored in memory, are easier to recall, can have a strong influence on preferences and decisions, and can lead to decisions errors, versus “nonarousing” positive and negative emotional experiences and events, which are less likely to be stored in and recalled from memory, would receive less attention from the system 2 cognitive resources, and therefore are less salient and influential to decision making;

- decisions that involve transactions, contexts and situations that are routine and familiar versus decisions that involve transactions, contexts and situations that are novel and unfamiliar and therefore more threatening to some but not all individuals;

leading to a higher risk that the human brain will make errors when processing, interpreting and categorizing information on novel and unfamiliar contexts and situations;

- when individuals are making decisions, the role and importance of the emotions in system 1 versus the cognitive and moral reasoning and calculation in system 2;

and how, why and under what circumstances system 1 emotions, instincts, intuitions etc. improve decision-making e.g. fewer options, more rapid decisions, less overly detailed analysis which can lead to decision aversion, avoidance and “paralysis”;

and can impair decision making when e.g. a more deliberate and potentially wiser decision needs to be made;

- and more specifically, how and why regulatory and other decisions activate different regions of the human brain depending on context, the number of choices and their attributes, differences and similarities; and whether one of the (for example) three decision options is clearly unattractive and is being used as a “decoy”;

as captured in the two concepts of: asymmetric dominance effects in decision making that are more automatic and perceptual and largely involve system 1 processing versus compromise effects which require more controlled and cognitive processing and comparison of options in system 2;

- the moral instincts in system 1 which are more automatic and unconscious, versus moral reasoning in system 2 which is more socially functional, can be more self-interested (e.g. tit-for-tat and positive reciprocity rather than true altruism), is less “truth seeking”, and can be “turned off and on” by the individual depending on context, the size of the reward and other factors;
- personal moral dilemmas that activate the emotions and moral instincts in system 1 versus impersonal and non-personal moral dilemmas that are largely processed and resolved in system 2;

regulatory compliance and performance could be enhanced significantly to the extent that regulatory authority functions and messages are designed, implemented and framed in a manner that converts the impersonal and non-personal moral dilemmas associated with non-compliance into personal moral dilemmas which challenge the self-identities and beliefs of senior executives and their regulated entities as law abiding, ethical and socially responsible entities;

- procrastination and decision delay and avoidance (decision aversion) versus fast and frugal heuristics and decisions/”preproperation” to enjoy benefits, payoffs and rewards and achieve objectives as quickly as possible;
- decision-making involving risk and uncertainty in: familiar, routine and conventional contexts versus new, unfamiliar, novel and therefore more threatening domains and contexts;

which can vary through time for the same domain e.g. the terrorist threat was very unfamiliar and threatening just after 9/11 but is now more familiar, routine and conventional;
- cognitive dissonance and identity and other conflicts that involve interactions and possible conflicts between different regions of the brain often in both system 1 and system 2; and,
- extrinsic (externally applied and imposed) incentives and motivations to contribute for example to the public good of complying with laws, regulations and social norms versus the intrinsic and image and reputation based incentives and motivations to comply (discussed in sub-section 3.6. below).

Understanding these and other interactions, competition and conflicts; how they are resolved,

partially resolved, or not resolved at all within the human brain; how their resolution and the extent of resolution can be influenced through priming, framing, cues, the regulatory game and the different strategies that are being played by different regulatory actors; and other aspects of the regulatory context can:

- (i) assist regulatory authorities when they are designing laws and regulations and designing, implementing and framing their outreach, monitoring, education, compliance promotion, enforcement response, deterrence, sanctioning, and other strategies, programs and messages;
- (ii) assist regulated entities when they are designing their pro-competitive and pro-compliance strategies as well as their anticompetitive, non-compliance and unethical strategies and programs that are intended to confuse, mislead, deceive, abuse, and manipulate their competitors, consumers, business customers and other regulatory actors including governments and their regulatory authorities; and,
- (iii) enhance the self-awareness and self-control of final consumers, other potential victims and beneficiaries and more vulnerable actors, and other regulatory actors when they are designing their coping and related strategies that they need to survive and prosper in the increasingly complex product markets and regulatory spaces of the modern economy.
- (iv) increase our understanding of the corporate governance scandals, the meltdown of the American subprime mortgage crisis, the global financial crisis and other regulatory scandals and disasters of the past three plus decades (see Exhibit I discussed below);

which perhaps can be explained in part by serious and unresolved conflicts within the human brains of the major participants leading to apparently dysfunctional and irrational preferences, conduct and decisions by many of them, which caused themselves, their companies, and their industries substantial and avoidable harm.

3.4 ... Further Exploration of the Regulatory Implications of These Interactions and Conflicts

However, much greater neuroeconomics, neuroscience and behavioral research is needed on:

- how these and other behavioral, cognitive and contextual variables and interactions between different brain regions that are associated with: risk, probabilities, uncertainty, and ambiguity; immediate versus delayed rewards and punishments; other regarding versus selfish preferences; complex regulatory, market and social contexts; and the associated interactions, competition, and conflicts and how they are resolved within the human brain; influence regulatory decisions, compliance, outcomes and performance;
- and, whether, how, when, why, and the extent to which regulatory authorities and other actors can influence these variables and interactions in a manner that promotes favorable regulatory outcomes for potential and actual beneficiaries and victims, regulated entities that prefer fair competition and compliance with laws, regulations and social norms, other regulatory actors, and the economy and society.

Other sub-sections of this Issues Note as well as our previous working papers suggest that this research could address some of the following issues. On the one hand, regulatory decisions that involve interactions, competition, and conflicts between different regions of the human brain are more likely to:

- (i) add to cognitive burden, strain, overload and dissonance and the system 2 “bad mood” of individuals;
- (ii) arouse the emotions and add to the influence of behavioral biases and flawed instincts, intuitions and heuristics;
- (iii) provide opportunities to the “more rational and less conflicted” players in the regulatory “game” to exploit their advantages over regulatory authorities, competitors, final consumers, business customers, and other players; and,

- (iv) increase the risk of Type I and II and related decision errors by regulatory authorities and decision errors by other regulatory actors that in some contexts would decrease public confidence and trust in the regulatory system, increase non-compliance and harm regulatory performance.

On the other hand, in some regulatory contexts, the cognitive burden, strain, overload and dissonance associated with these interactions and conflicts could encourage and force regulated entities to: think harder about the true and full opportunity costs of non-compliance; and, design and use simpler, less information and cognition intensive “fast and frugal” heuristics, professional intuitions and moral and other instincts largely in system 1, which can lead to reasonably satisfactory preferences, choices and decisions and on balance can favour fair competition and compliance in some and perhaps many regulatory contexts.

Greater dependence on the emotions, professional and other intuitions, moral and other instincts, fast and frugal heuristics, and related attributes of system 1 may be one of the major consequences of the more complex, unpredictable, ambiguous and inter-connected regulatory regimes of the future. This situation may on balance be more favorable to the quality of regulatory decisions, compliance and performance than would be presumed by many behavioral economists and neuroscientists who focus more on the flawed intuitions, instincts and heuristics and related decision errors in system 1.

Finally, further research on the implications for regulatory compliance and performance when regulatee decisions involve interactions, competition and conflicts between different regions of the human brain could provide more specific and implementable insights on how regulatory authorities can use strategic ambiguity and other measures when they design, implement and frame their various regulatory functions, strategies and messages.

For example:

- framing compliance promotion strategies in a manner that gives more equal weight to the financial, social and ethical rewards from compliance and the interactions between different types of compliance rewards;
- and pays more attention to the aversive outcomes and related opportunity costs of non-compliance, including the associated fears, foreboding, stress, anxieties, and cognitive strain and dissonance;
- and framing regulatory harms in a manner that transforms non-compliance from an impersonal moral dilemma to a personal moral dilemma for which the senior executives of regulated entities will be held accountable by themselves and others;

could make positive contributions to the regulatory compliance and performance of regulated entities at many of the stages of the regulatory compliance continuum presented in Exhibit I on the next page.

These and other regulatory implications and research issues associated with interactions, competition and conflicts within the human brain are further discussed in other sub-sections of this Issues Note.

3.5 Importance of Context to the Functioning of the Human Brain

The human brain is a “social brain”. As a consequence:

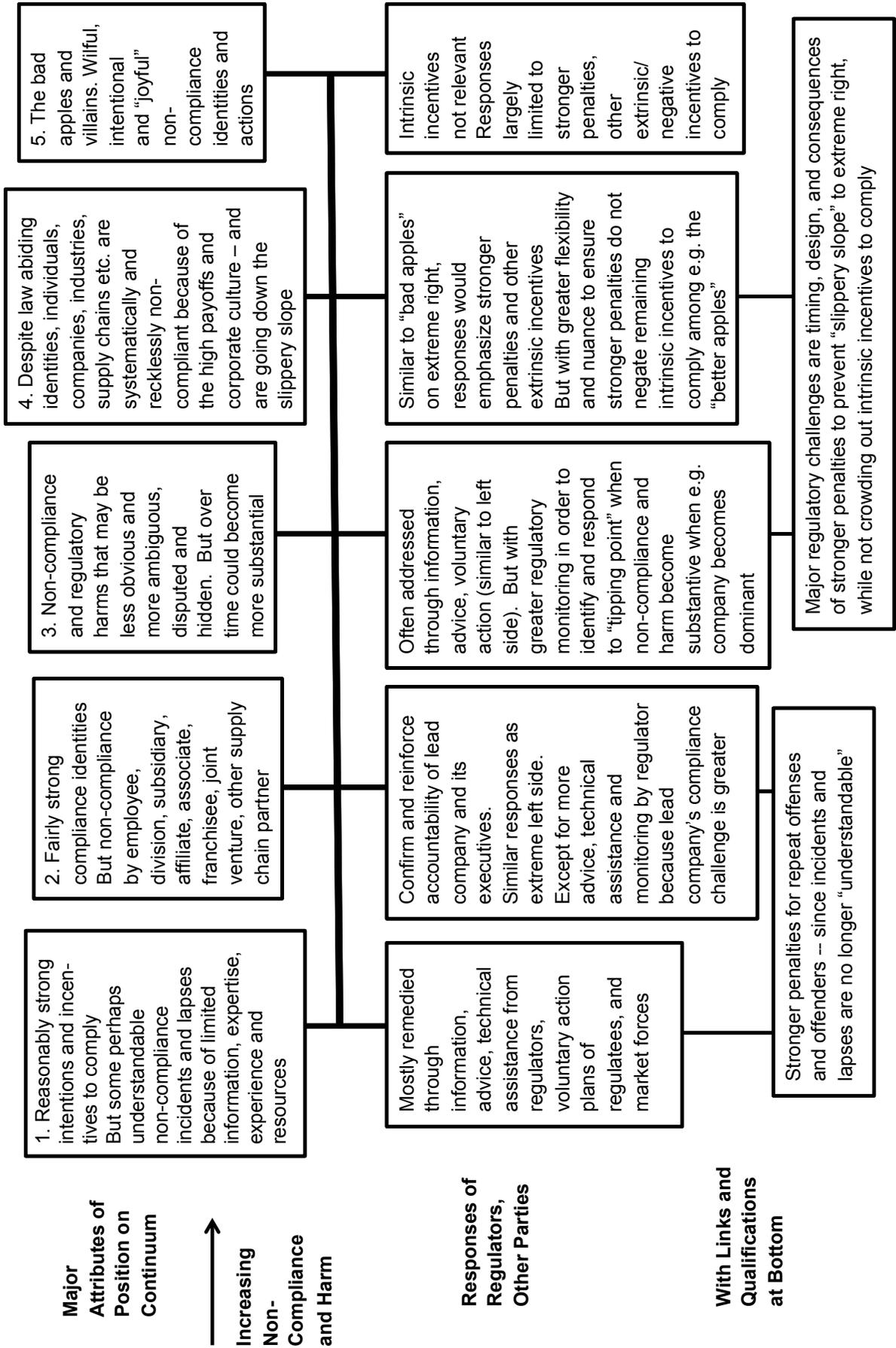
- (i) the functioning of the different regions of the human brain, and
- (ii) the regulatory and other preferences, choices, decisions and learning that result from system 1 and 2 and the interactions between the brain’s different regions and systems;

depend critically on the economic, market, social and regulatory context, and on the quality of and outcomes from the transactions and other interactions that take place between the “human brains” of individuals and organizations in different contexts.

One of the most important contributions of behavioral economics, neuroeconomics and other less conventional literatures is the growing emphasis these literatures are placing on context and the transactions and other interactions that occur in different natural, economic, market, social and other environments, contexts and systems between economic agents that are boundedly rational but willing to learn and doing the best they can.

For these literatures, preferences, choices, decisions and learning are context dependent and never take place in a vacuum. The human brains of individuals and organizations are continually adapting to and learning from their environments and contexts, and when possible using their learning to alter these environments in their favour.

Exhibit I: The Compliance/Non-Compliance and Regulatory Harm Continuum



In contrast, more conventional economics literatures either ignore context and social interaction or simply presume that contexts and the transactions and interactions that take place within different contexts are predictable, functional, efficient, optimal and mutually beneficial to all economic agents. Otherwise, the context (e.g. the company, other organization, market, or the market, business or social relationship) would not exist, and the transaction or other interaction would not take place.

Behavioral economics, neuroeconomics and evolutionary economics illustrate the ability of human beings to interact with, adapt to and learn from their natural, economic, market, and social environments, and to use that learning to alter their environments which then influences and enhances development of the brain, overall personal development, and the well-being of the individual's "social group" in the future. This is one of the major reasons why human beings have been more flexible, adaptive, resilient and (unfortunately) destructive than many other species.

These interactions and feedback effects between environments/contexts and the various system 1 and 2 regions of the "social brain" have major implications for regulatory regimes, compliance, performance, and contexts. These insights on context, social cognition and the social brain further illuminate the important role played by senior executives in providing signals, messages, cues, and frames that determine whether the corporate culture of a company or other regulated entity favours fair competition and compliance, or non-compliant, unethical and illegal conduct and decision making.

For similar reasons, the views, attitudes, preferences, beliefs and regulatory philosophy of the senior managers of a regulatory authority can have a major influence on whether the regulator and its officials are proactive or reactive, flexible or rigid, formal/paternalistic or collegial/helpful, trusting or skeptical/threatening, and favour robust enforcement over compliance promotion or the reverse.

Ingroup loyalty, information and gossip and advice, guidance and pressure from trusted peers and colleagues can have important influences on an individual's moral and other intuitions and instincts, and on overcoming our innate conservatism, inertia, status quo bias, and resistance to change. Furthermore, people who consider themselves to be fair minded, cooperative, trusting and trustworthy:

- experience pleasure and utility,
- are placed in a good mood,
- suffer less stress, anxiety, identity conflict and cognitive dissonance, strain and overload,
- learn more easily and quickly and better apply what they have learned,
- are more creative and innovative, and
- are more prepared to accept change and potentially profitable and beneficial risks;

when they are working and interacting with like-minded people in companies, government departments and agencies, civil society groups, and other organizations and contexts – that promote transparency, open communication, learning, fairness, cooperation, trust, reciprocity of trust, and ethical conduct within the organization and with external partners.

Companies and other organizations with these favorable behavioral and contextual attributes are more likely to be productive, efficient and competitive and to comply with laws, regulations and social norms. And when companies and other organizations with these favorable attributes interact together within regulatory regimes, systems, and contexts, regulatory compliance is more likely to become routine, conventional, habitual, and the default option and to exceed regulatory obligations throughout the regime.

Different contexts can place different demands on our cognitive functions and resources and our ability to make high quality decisions. Some contexts and environments provide choices and decision options that are few in number, relatively conventional, routine and familiar, and comparatively easy to evaluate and compare. Other contexts and environments provide choices and decision options that are larger in number, more complex and interrelated, and/or involve greater risk, uncertainty and novelty and delayed benefits and costs.

In these more complex and dynamic contexts, the professional intuitions, moral instincts and fast and frugal heuristics of system 1 are often less helpful and are more likely to result in decision and other errors; and the demands placed on our scarce cognitive and moral reasoning, deliberation, calculation, strategic thinking, and other capabilities are much greater – leading to a higher risk of information overload, cognitive burden, strain, overload and "bad mood",

and lower quality decisions and decision aversion and avoidance in system 2.

A related insight from these behavioral and other less conventional literatures is that the intelligence, knowledge, expertise, emotions, professional and other intuitions and instincts, and bounded rationality of individuals and organizations, and how these attributes influence the speed and quality of their decisions and learning, are context and domain-specific. The same individuals and organizations can appear to be geniuses in some regulatory, market and social contexts, and totally out of their depth in others.

The senior executives and other employees of regulated entities, regulatory authorities and other regulatory actors will more often be operating in contexts and domains that lie outside their comfort zone as markets, industries, economies, technologies, corporate entities and regulatory regimes:

- become larger, more diversified and knowledge-based, and increasingly globalized, inter-connected, complex, and unfamiliar;
- and encompass individuals and organizations from a growing number of diverse countries, cultures, religions, and ethnic and language groups;
- who often but not always may speak the same language (typically English) but have very different professional and cultural backgrounds and languages – recent advances in neuroscience indicate that people with different cultures and languages have cognitive processes that are also different.

One can only imagine the regulatory, business, social, and related challenges faced by corporations and business groups from emerging market economies that were recently privatized or have always been privately or family owned but highly protected by the state – when they are entering the North American and European markets for the first time.

However, much greater research is needed to extend these and other contextual insights from the behavioral and neuroscience literatures to regulatory regimes and environments. For example, there is a growing experimental and empirical literature which suggests that, in many market and regulatory contexts and environments, regulated entities will respond to expanding complexity, novelty and ambiguity through designing and implementing fast and frugal heuristics and strategies that, on balance, will promote greater efficiency, competition and compliance with laws,

regulations and social norms. However, the contextual and behavioral foundations for this presumption require much greater theoretical, empirical and experimental research from a regulatory perspective.

3.6 Extrinsic, Intrinsic and Image-based Incentives and Motivations to Comply, Offsetting Biases, and Related Considerations

Behavioral economics and neuroeconomics have greatly enhanced our understanding of the many behavioral and contextual factors, including the actions of governments and their regulatory authorities, that influence the: (i) “extrinsic” (external and generally negative) incentives and motivations, (ii) “intrinsic” (internal and generally affirmative and positive) incentives and motivations, and (iii) image, reputation and related social incentives and motivations (also generally positive) of regulated entities to comply with laws, regulations and social norms.

These literatures also add to our understanding of why, how and under what circumstances these extrinsic, intrinsic and image based incentives and motivations can interact together in a positive or negative manner; and can change through time in response to external shocks and other fundamental changes to the regulatory environment and the life-cycle of the company, industry, market, product and technology.

Increased understanding of these incentives and motivations are especially important to:

- (i) the design, implementation and framing of laws, regulations, and the monitoring, outreach, education, compliance promotion, case selection, enforcement, response, deterrence, sanctioning and other regulatory functions, strategies and messages of regulatory authorities;

in order to make the rewards from compliance and the punishments and other aversive outcomes from non-compliance as salient and easy to recall and imagine as possible for regulated entities (see as well the earlier discussion on the true and full opportunity costs of non-compliance);

- (ii) better targeting costly enforcement cases and related enforcement response actions on non-compliant conduct and companies and the regulatory harms that are most substantial, systemic and detrimental to consumers, other market participants, market efficiency and fairness, the public interest, and public trust in the regulatory system; and,
- (iii) using voluntary compliance action plans and codes of conduct, other forms of self-regulation and co-regulation, technical support and advice, positive feedback on compliance efforts and successes, and other less intrusive initiatives and “nudges”;

which are designed to enhance the sense of competence, autonomy, agency and control, and the intrinsic incentives and motivations to comply of regulated entities that have strong compliance records but from time to time have non-compliance lapses.

Behavioral economics combined with recent advances in neuroeconomics and neuroscience also illustrate how the debiasing and learning benefits from high quality interactions between regulators and regulatees as well as with other regulatory actors – when combined with the multiple and complex (system 1 and system 2) learning processes that take place in individuals, companies and other regulated entities – can in some contexts help to entrench compliance within the corporate cultures of regulated entities, and make compliance the private and social norm, convention and “default option” within regulated firms, supply chains, business groups, networks and ecosystems, and other regulated entities.

As noted earlier, neuroeconomics, psychology and neuroscience scholars have found that intrinsic and extrinsic incentives and motivations activate different regions in the human brain. These findings suggest that tasks, conduct and decisions that are associated with and result from intrinsic incentives and motivations are more rewarding and pleasurable to individuals than tasks, conduct and decisions that are forced on the individual through extrinsic, externally applied and imposed, incentives, motivation and threats of punishment.

3.7 ... And Their Implications for Rules-Based Versus Principles-Based Regulatory Philosophies and Regimes

As a consequence, recent advances in the behavioral, psychological and neuroscience literatures on extrinsic, intrinsic and image and reputation based incentives and motivations to contribute to public goods, including the public good of regulatory compliance and performance, appear to strengthen the arguments that favour:

- principles-based, outcomes-based, and performance-based regimes – which are focused on outputs and outcomes and provide regulated entities with the latitude to find and apply their own efficient, innovative and creative ways to solve regulatory problems and contribute to regulatory compliance and performance;
- compared with command-and-control rules-based regulatory regimes – that are focused on regulatee inputs, functions, and tasks, and force the regulatee to employ the technologies, production processes, and organizational, marketing, and other methods that are specifically described in the law, regulations and technical standards.

Because principles-based regimes provide regulated entities with the latitude, autonomy and responsibility to design and implement their own solutions to regulatory challenges and problems, principles-based regulation appeals to: regulatees’ sense of competence, self-confidence, and self-esteem; their self-identity as a trustworthy reciprocator of the confidence and trust of the regulator, other regulatory actors, and general public; and their desire to exercise agency and control over their regulatory programs and environments – in a manner that promotes their intrinsic and image and reputation based incentives and motivations to comply with laws, regulations and social norms.

In contrast, because of its black and white, either/or nature, a rules-based regime likely places greater weight on extrinsic over intrinsic and image based incentives, and allows regulated entities to ignore inputs, functions and tasks that could be causing harm but are not explicitly covered in the law, regulations and technical standards. Furthermore, it is possible and even probable that, under a principles-based regime:

- (i) Regulatees have more space, opportunity and encouragement to create, develop, maintain and strengthen their intrinsic and image based incentives to comply; and, more opportunities, incentives and motivation to learn from their

experience, successes and mistakes when designing and implementing their own solutions to regulatory problems.

As noted above, principles- and outcomes-based regimes enhance the sense of control, agency, autonomy, empowerment, and competence of regulated entities, in part through reducing and eliminating the regulatee tasks and functions that are seen as trivial, boring, and uninteresting, are not relevant and beneficial to the regulated entity, and are only conducted to satisfy the regulatory requirements imposed on them by the regulator.

Through reducing and eliminating these tasks and functions, the financial, reputational, status, positive feedback and other performance contingent extrinsic rewards from complying with a principles- and outcomes-based regime are more likely to enhance rather than crowd out intrinsic incentives and motivations to comply.

- (ii) Governments and their regulatory authorities have more opportunities and policy space to enhance the incentives, motivations, capabilities and will of regulated entities to comply with relevant laws, regulations, rules and social norms and to make other contributions to regulatory performance.

This is accomplished in part through, as noted above, reducing and eliminating unnecessary costs and other burdens, irritants, frustrations, and boring and uninteresting tasks that, from the regulatees' perspective, provide no benefit and are carried out, in an unmotivated, bare minimum and "going through the motions" manner in order to satisfy the regulatory requirements of the rigid rules-based regime.

This can also result from the collective efforts of regulatory authorities in different countries and jurisdictions to make regulatee compliance easier, less costly and more routine through information sharing, cooperative enforcement and other actions, and better aligning their laws, regulations and regulatory functions.

- (iii) Because of social cognition, identification, imitation and "multiplier effects", intrinsic incentives and motivations to comply will more often expand outward from individual regulated entities to become major components of the collective norms, values, identities and reputations of regulated supply chains, markets, and industries.

- (iv) And the application of extrinsic incentives to comply in the form of punishments (monetary penalties, naming and shaming etc.) and financial and non-financial rewards will less often have a consequential crowding out effect on the intrinsic incentives and motivations to comply of regulated entities.

Expanding on the fourth point, crowding out effects could be smaller under a principles- and outcomes-based regime because the extrinsic incentives and motivations are being applied within a regulatory context:

- that is characterized by collegiality, mutual respect, and shared information, learning, mental models, responsibilities, objectives and goals;
- and that privileges regulatee autonomy, agency, self-determination, innovation and creativity.

Therefore, regulatees are more likely to be willing to accept the value and utility of the externally directed task because they are more likely to understand and endorse the underlying extrinsic goal that is associated with the task.

3.8 Intrinsic and Extrinsic Incentives and Motivations as a Continuum

The psychology, behavioral economics, neuroeconomics, and neuroscience literatures on incentives and motivations indicate that intrinsic and extrinsic incentives are best considered as a continuum, where the location of the incentive and task on the continuum is based on the extent of autonomy, control, agency and self-determination that the individual possesses when conducting the task.

Image and reputation based incentives and motivations and associated tasks would therefore lie somewhere in the middle of this continuum. Future research should bring together this continuum with the compliance/non-compliance continuum discussed in this document and the other working papers of the author and his colleagues.

When this is done, the continuum from: most to least extrinsic, with the most to least potential for crowding out effects; and then from least to most intrinsic with the least to most potential for crowding in effects; could have some of the following characteristics – going from the far-right end of the continuum through the middle locations to the far left-end at the eighth location below.

- 1) The far-right end of the continuum is dominated by extrinsic incentives and motivations associated with mundane, trivial, uninteresting, boring and non-beneficial tasks and related regulatory activities (e.g. filling out a standard information form every month).

These tasks and associated extrinsic incentives are deemed to be frustrating, irritating, demeaning and useless by the regulated entity; are forced on the individual, firm or other organization by a regulator or some other outside party; involve substantial outside control but little skill, capability and competence; involve rewards that are contingent only on completing the task (not on task quality and performance and therefore not on the skills and competence of the regulatee); and send a strong signal from the regulator to the regulated entity that the regulatee is not trusted and the regulator does not believe in the regulatee's competence, interest, and intrinsic incentives and motivation to comply and contribute to regulatory performance.

- 2) Extrinsic incentives and motivations are still associated with completing tasks rather than performance standards, which are still forced on the regulated individual, company or other organization by a regulator or other outside party.

But these tasks are more interesting, require more skill, expertise and competence to complete, and provide some benefit to the regulated entity – because e.g. the task is better aligned with the regulated entity's own requirements as a consequence of mutually beneficial consultations and other interactions that have taken place between the regulator and regulatee.

The extrinsic incentives and motivations at this location would be expected to encourage compliance for at least the short term, but compliance may not be sustainable. Lack of sustainability is partially because many of the regulatees' interactions with regulatory authorities and other regulatory actors generate cues and other information and stimuli that involve loss of autonomy, agency and control – which accumulate through time and are stored in the memories of regulatees and their officials, and over the medium and longer term further dampen intrinsic incentives and motivations to comply.

- 3) High-powered extrinsic incentives, motivations, rewards, and punishments require that the regulatee complete relatively numerous and mundane tasks to display compliance to the regulator and others, which can promote regulatee compliance fairly well for the short to medium term but may not be sustainable in the long run.

This location on the continuum could encompass situations where regulatory authorities use a blitz-type enforcement and sanctioning campaign for a short period of time. This campaign would include greater use of monetary and non-monetary rewards, enhanced monitoring, more frequent and rigorous inspections, investigations, other enforcement actions, and threats of enforcement, and more severe monetary, naming and shaming and other penalties.

However, the campaign would be short-lived and generate only short-term benefits for regulatory compliance and performance because for example:

- (i) the regulatory authority has limited resources and cannot sustain the campaign for an extended period, and these resource limitations are known to the regulated population who make only short term cosmetic changes to their compliance and related strategies to reduce the short-term risk of detection;
 - (ii) cutbacks in the regulator's budget take place a year or so after the campaign begins; and/or
 - (iii) the government and regulator develop a false sense of confidence and security from early campaign successes and incomplete or faulty data on reductions in non-compliance and regulatory harm among some of the industry leaders and other regulatees.
- 4) Extrinsic incentives and motivations are associated with completing a task and meeting a performance standard that are fully established and controlled by the regulator or other outside party.

For these kinds of performance-contingent rewards where the rewards is linked to individual or organizational performance, there is even a stronger sense of outside control, since individuals and organizations have to meet the externally imposed performance standard in order to maximize the reward and minimize

the risk of detection and punishment from not meeting the standard.

As a result, there can be a stronger tendency for these rewards to undermine intrinsic motivation. However, performance-contingent rewards can also convey substantial positive competence information and messages when the individual or organization does well enough to receive a level of reward that signifies excellent performance. These more positive messages of competence and excellence can offset some of the negative effects of control on intrinsic incentives and motivations to comply. At this location in the continuum, intrinsic incentives and motivations are becoming more prominent and the possibility that crowding in effects will be greater than crowding out effects becomes greater.

- 5) Extrinsic incentives and motivations are also associated with completing a task and meeting a performance standard.

But the tasks and performance standards are established through consultations and other interactions between the regulator, regulatee and perhaps other regulatory actors in order to better meet the operational, innovation and other business needs and utilize the skills, capabilities, competencies and expertise of regulatees and other actors – such as when the regulator and regulated population collectively decide to establish the task and performance standard through a voluntary code of conduct rather than a mandated rule and technical standard.

- 6) Intrinsic incentives and motivations and associated tasks, performance standards and rewards, are driven by the regulatees' participation in, identification with, and strong sense of loyalty, responsibility and obligation towards a broader group – such as a supply chain, business group, network, ecosystem, and community, industry, market or regulatory regime based on e.g. the principles-based and polycentric regulatory model.

And therefore, the incentives and motivations of the regulatees are mainly based on and driven by the desire to satisfy the social norms and preferences of the group and to establish, maintain and protect the common-pool reputation, image, status, identity and other resources that were collectively developed by the regulated entities working in partnership

with regulatory authorities and other regulatory actors. At this location on the continuum, image, reputation and identity based incentives to comply become more prominent and influential and further reduce the possibility that extrinsic incentives will dampen and crowd out intrinsic incentives.

- 7) Even stronger intrinsic incentives and motivations and associated tasks, performance standards and rewards are driven by the strong self-identities, self-images, and self-reputations of the regulated population as law abiding, socially responsible corporate citizens.

At this location, intrinsic incentives and motivations:

- (i) are based on a strong sense of autonomy, control, agency, and freedom of choice by the regulatee,
- (ii) involve highly interesting, challenging and competence and excellence affirming tasks and performance standards that are inherently satisfying to perform, complete and achieve, and
- (iii) are driven by the self-identities, self-reputations, and self-identities of the regulatees and their senior executives and other employees as socially responsible and law abiding individuals and corporate citizens, that have strong social preferences and norms, other-regarding preferences, and sense of altruism and the public good.

As a consequence, the regulatees at this location would likely continue to comply even when other entities are not complying; and regulatory authorities and other actors are less active and threatening and generating fewer extrinsic incentives, motivations, rewards and punishments, because of reduced regulatory budgets and capabilities.

- 8) And at the far-left end of the extrinsic and intrinsic continuum, even stronger intrinsic incentives and motivations are based on mixing the best qualities of locations six and seven.

In this best of all possible regulatory worlds, internalization and integration would be associated with and driven by social identity, reputation, status and approval under the sixth location on the continuum, self-identity, self-

reputation and self-approval under the seventh location, and some combination of the best attributes of two locations operating in an interactive and cumulative manner.

Combining the two together and the resulting interactive, cumulative, feedback and path dependent effects would thereby represent an extreme left end location on the continuum – which could be both more likely than the previous two and perhaps more stable and enduring for the reasons discussed earlier in this appendix under social preferences, norms and cognition, and the social brain.

The insights from the neuroeconomics literature on reinforcement, error-driven and other forms of learning, based on experience, rewards, punishments, avoidance of punishments and other aversive situations and outcomes, and our interactions with other regulatory actors and the regulatory environment, can also provide important guidance to regulatory authorities and their compliance partners and champions. These learning insights are especially helpful in suggesting how:

- compliance promotion, enforcement response, deterrence, sanctioning and other strategies, programs and messages can be designed, implemented and framed;
- in order to make compliance the norm, convention and default option of some regulatees and place other less-compliant regulated entities on the pro-compliance path.

Behavioral economics and neuroeconomics support and strengthen the arguments for careful and objective fact intensive, evidence based, risk-based, dynamic, market oriented, case-specific and balanced analytical approaches and frameworks by regulatory authorities, government ministries, and other regulatory actors.

These approaches and frameworks need to take full account of: regulatory history and context; the incentives, motivations and constraints of all regulatory actors; the life-cycle of the regime and its regulated entities, goods, services, technologies, industries and markets; the current trajectory of the regulatory regime towards or away from a more compliant and socially responsible future; and the locations of individual regulatees and the regulatory regime on the compliance/non-compliance continuum and the intrinsic/extrinsic continuum discussed earlier (see Exhibit I above).

The insights from behavioral economics and related less conventional literatures are especially important during periods of slow growth, fiscal restraint and constrained regulatory budgets of governments and non-government entities in OECD, emerging market and developing economies – when all regulatory actors need to economize on their scarce regulatory resources, minimize the risk of Type II, Type I and other regulatory errors, and apply less resource intensive nudge, fix-it-first, voluntary action, and other less intrusive and costly remedies whenever feasible.

The insights from behavioral and related literatures also take on greater relevance when businesses, consumers, regulatory authorities and other economic agents are facing products, technologies, and market situations that are unfamiliar, innovative, novel and outside their comfort zone.

During periods of economic turbulence and major economic and technological change, having some knowledge of the locations of regulated entities on the compliance/non-compliance and intrinsic/extrinsic continuums will be especially relevant to assisting regulatory authorities to target their limited financial, technical and other resources on the regulated entities and regulatory risks and harms that represent the greatest threats to competition, consumers, health and safety, the environment, social welfare, and other regulatory objectives.

Behavioral biases, flawed heuristics and information, cognition and other constraints are conceptually similar across all economic actors, but have different weights, influences, implications and outcomes for consumers, businesses, government ministries, regulatory authorities, civil society groups, and other organizations. These differences between economic actors can result in offsetting effects and learning and debiasing benefits that in many but not all market contexts can favour compliance, fair competition, and pro-social conduct and outcomes.

These insights from the behavioral and other less conventional economic literatures on incentives, motivations and context, and their influence on preferences, decisions, and regulatory risks and errors, are important to regulatory authorities in all countries including the more advanced OECD economies.

Nonetheless, these insights may be especially relevant to competition, consumer protection and other regulatory authorities in emerging market and developing economies – where:

- (i) all regulatory actors: regulators, regulatees, intended beneficiaries, potential victims and other stakeholders, have comparatively limited regulatory information, knowledge, learning, experience, capabilities and financial, technical and other resources;
- (ii) regulatory actors are facing regulatory, market and other contexts that are often highly complex, novel and unfamiliar because of the dynamic and transformative changes taking place in their economies and societies; and,
- (iii) regulatory actors need to allocate their scarce attention span, cognitive and other resources to other functions, priorities, demands, and pressures that are more immediate, urgent and salient.

For regulatory authorities in emerging market and developing economies, it is especially important for them to have some information and insights on the locations of individual regulatees and the regulatory regime on the compliance/non-compliance and intrinsic/extrinsic continuums.

that intrinsic and extrinsic incentives are best considered as a continuum, where the location of the incentive and task on the continuum is based on the extent of autonomy, control and self-determination that the individual possesses when conducting the task. Image and reputation based incentives and motivations and associated tasks would therefore lie somewhere in the middle of this continuum. Future research should bring together this continuum with the compliance/non-compliance continuum discussed in this document and the other working papers of the author and his colleagues.

The insights from the neuroeconomics literature on reinforcement, error-driven and other forms of learning, based on experience, rewards, punishments, avoidance of punishments and other aversive situations and outcomes, and our interactions with other regulatory actors and the regulatory environment, can also provide guidance to regulatory authorities and their compliance partners and champions.

These learning insights are especially helpful in suggesting how:

- compliance promotion, enforcement response, deterrence and other strategies, programs and messages can be designed, implemented and framed,

- in order to make compliance the norm, convention and default option of some regulatees and place other less-compliant regulated entities on the pro-compliance path.

Behavioral economics and neuroeconomics support and strengthen the arguments for careful and objective fact intensive, evidence based, risk-based, dynamic, market oriented, case-specific and balanced analytical approaches and frameworks by regulatory authorities, government ministries, and other regulatory actors.

These approaches and frameworks need to take full account of: regulatory history and context; the incentives, motivations and constraints of all regulatory actors; the life-cycle of the regime and its regulated entities, goods, services, technologies, industries and markets; the current trajectory of the regulatory regime towards or away from a more compliant and socially responsible future; and the locations of individual regulatees and the regulatory regime on the compliance/non-compliance continuum and the intrinsic/extrinsic continuum discussed earlier (see Exhibit I above and Exhibit II at the end of this Note).

The insights from behavioral economics and related less conventional literatures are especially important during periods of slow growth, fiscal restraint and constrained regulatory budgets of governments and non-government entities in OECD, emerging market and developing economies – when all regulatory actors need to economize on their scarce regulatory resources, minimize the risk of Type II, Type I and other regulatory errors, and apply less resource intensive nudge, fix-it-first, voluntary action, and other less intrusive and costly remedies whenever feasible.

The insights from behavioral and related literatures also take on greater relevance when businesses, consumers, regulatory authorities and other economic agents are facing products, technologies, and market situations that are unfamiliar, innovative, novel and outside their comfort zone. During periods of economic turbulence and major economic and technological change, having some knowledge of the locations of regulated entities on the compliance/non-compliance and intrinsic/extrinsic continuums will be especially relevant to assisting regulatory authorities to target their limited financial, technical and other resources on the regulated entities and regulatory risks and harms that represent the greatest threats to competition, consumers, health and safety, the environment and other regulatory objectives.

Behavioral biases, flawed heuristics and information, cognition and other constraints are conceptually similar across all economic actors, but have different weights, influences, implications and outcomes for consumers, businesses, government ministries, regulatory authorities, civil society groups, and other organizations. These differences between economic actors can result in offsetting effects and learning and debiasing benefits that in many but not all market contexts can favour compliance, fair competition, and pro-social conduct and outcomes.

These insights from the behavioral and other less conventional economic literatures on incentives, motivations and context, and their influence on preferences, decisions, and regulatory risks and errors, are important to regulatory authorities in all countries including the more advanced OECD economies.

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- (i) all regulatory actors: regulators, regulatees, intended beneficiaries, potential victims and other stakeholders, have comparatively limited regulatory information, knowledge, learning, experience, capabilities and financial, technical and other resources;
- (ii) regulatory actors are facing regulatory, market and other contexts that are often highly complex, novel and unfamiliar because of the dynamic and transformative changes taking place in their economies and societies; and,
- (iii) regulatory actors need to allocate their scarce attention span, cognitive and other resources to other functions, priorities, demands, and pressures that are more immediate, urgent and salient.

For regulatory authorities in emerging market and developing economies, it is especially important for them to have some information and insights on the locations of individual regulatees and the regulatory regime on the compliance/non-compliance and intrinsic/extrinsic continuums.

3.9 Coping Skills and Strategies of More Vulnerable Economic Agents

The demand side insights from behavioral economics, neuroeconomics and related literatures indicate that the sellers of goods, services and assets often have informational, behavioral, negotiating position and related contextual advantages compared to final consumers, business customers and other purchasers of their products.

Dissatisfaction with and detriment from their purchases can be particularly serious for more vulnerable consumers and households because of limited incomes, education, market experience, self-confidence, time, energy, attention span, and interest, as well as high indebtedness, limited access to consumer financing, and high interest charges when commercial financing is provided.

Recent research has indicated that compared with more prosperous consumers and households, lower income consumers and households with limited purchasing power and access to financing are under much greater cognitive, time, emotional, attention span, and other pressures and strain – in order to minimize their purchasing errors and to make difficult purchasing decisions and trade-offs and thereby ensure that their basic consumption needs are met until the next pay cheque, unemployment benefit, or welfare cheque arrives.

Lower income and other more vulnerable and disadvantaged consumers and households develop coping skills and strategies in response to their income, time, cognition and other constraints and scarcities, but these as well require time, effort, attention span and cognitive effort. These insights from the psychology of scarcity literature can likely be extended to smaller businesses, where profits and discretionary business income are low, meeting payroll, financing costs, and other recurring costs are a monthly challenge, and the time, cognitive effort, attention span, and financial resources required to design and implement compliance programs are limited.

At the same time, the subprime mortgage collapse, corporate governance scandals and other recent regulatory incidents and disasters indicate that buyers with comparatively good incomes, educations, capabilities, market experience and self-confidence are not immune from making detrimental purchasing decisions. In addition, all purchasers from the most vulnerable to the most experienced and self-confident can learn from their mistakes, develop and implement

coping skills and strategies, and use voice and exit to cause substantial harm to producers and vendors that violate their trust and exploit their disadvantages.

3.10 Better Understanding of More Complex Corporate Entities and Other Organizations

Trust, reciprocity of trust, being a trustworthy reciprocator, mutual respect and obligations, and other behavioral attributes are very important to the management, success and sustainability of state-owned, family owned, and privately owned business groups, networks, and ecosystems, national and global supply chains, industrial and technology clusters, and other corporate entities comprised of nominally independent companies that share common goals and technology, organizational and other platforms.

These more complex corporate entities are becoming increasingly prominent in the OECD, emerging market and other economies in the globalized and knowledge-based economy of today and tomorrow – especially in the OECD countries because of the “going global” strategies of the rapidly expanding state, family and privately owned business groups, networks and ecosystems and supply chains based in the BRICS and other emerging market economies.

These same insights from behavioral economics, neuroeconomics, and neuroscience also help us to better understand more complex organizations that are not private entities, such as industry, trade and professional associations, non-profit civil society groups, and government ministries, regulatory departments and regulatory agencies, which also play active roles in markets and regulatory regimes and spaces.

In particular, recent advances in the field of “social neuroscience” on the “social brain”, within group loyalty, the often more difficult and contentious relationships between groups, and the “insider versus outsider” perspective, can increase our understanding of how cooperation, loyalty, and related social norms and informal rules of business conduct are established and maintained within large international corporations, business groups, networks, and ecosystems, and other more complex corporate entities – which operate in multiple countries and encompass employees and supply chain and business partners with diverse ethnic, religious and social backgrounds and traditions.

These insights on the social brain can be extended to regulatory regimes that have strong compliance records that at times can exceed legal and regulatory requirements. This however requires the establishment and maintenance of strong within group cooperation, trust and loyalty that cuts across all regulatory actors – including between e.g. regulatory authorities and regulated entities, and regulatees and final consumers/ other beneficiaries, which typically have different incentives, interests and professional and educational backgrounds.

Strong within group identities and loyalties and “them versus us” attitudes can also help to explain the strong competition and inter-group rivalry and at times hostility, as well as the limited cooperation and trust, which can take place over extended periods of time between well-established business groups, networks and eco-systems and other more complex corporate entities. The resulting conflict, hostility and overly aggressive competition can increase the potential for anticompetitive, non-compliant and anti-social conduct and outcomes, where final consumers, smaller businesses, other more vulnerable regulatory actors, and the public interest become “collateral damage”.

3.11 Valuation, Decision Making and Learning

The underlying premise of the working papers and research program of the author and his co-authors and colleagues is that individuals and by extension regulated entities, regulatory authorities and other organizations and regulatory actors are boundedly rational but willing to learn entities that are doing the best they can, and normally make reasonably satisfactory choices and decisions despite their limitations of information, time, energy, interest, attention span and cognitive resources.

The neuroeconomics and neuroscience literatures illustrate how and why various regions of the human brain in the “fast thinking” system 1 and the “slow thinking” system 2 are activated when: individuals place values on more tangible objects (e.g. products and financial rewards) and more intangible objects (e.g. experiences, self-identity, reputation, non-financial rewards); assess and compare their choices and decision options; make their final decisions; and learn from their experience, successes, mistakes, and interactions with others. These insights are especially relevant to regulatory “games”, contexts, regimes, actors, compliance and performance.

Various regions of the human brain in system 1 and 2 are implicated and activated when individuals and organizations:

- (i) Are interpreting and processing information on and making decisions in contexts that involve risk, probabilities, uncertainty, ambiguity, equity, fairness, and unfairness and the interactions and potential conflicts between these concepts.

For example, an individual is more likely to accept a risky gamble and participate in a highly risky and uncertain venture when her or his partner has developed and is maintaining a well-earned reputation as a fair, cooperative, socially responsible, trusting, and trustworthy individual.
- (ii) Compute values on: the goods and services they buy and sell; their anticipated and actually experienced incentives, rewards and related sources of pleasure and utility; the investments they make; the efforts they make to avoid risk, ambiguity, losses and other aversive situations and outcomes; the relationships they develop with other individuals, their places of employment and other organizations; the donations they make to charities; their contributions to other public goods; and their reputations and self-identities as either law abiding individuals/corporate citizens or as renegades and outlaws.
- (iii) Compare these various values in order to develop and assess their decision options and make decisions.
- (iv) Learn from their experience, successes, mistakes, fears, and the rewards they receive, the aversive outcomes they avoid, and the punishments and other pain and disutility that they incur – especially when rewards and punishments are different from their previous experience and current hopes, predictions and expectations. This is called reinforcement and error-driven learning in the neuroscience literature and largely takes place in system 1 of the human brain (see Exhibit II at the end of this Issues Note).
- (v) Are learning as well from their transactions, meetings and other positive and negative interactions with other people and organizations – particularly through the competitive and regulatory games that they are “playing” with other market participants and regulatory actors.

Regulatory regimes are essentially complex social systems where what the neuroscience literature calls

“social learning and teaching” – that is, learning from other people and organizations such as relative, friends, colleagues, peers, superiors, business, supply chain and other partners, competitors, final consumers, regulatory authorities and other government entities, civil society groups, and other market participants and regulatory actors – play a major role in determining the individual success of regulatory authorities, regulated entities, and other organizations and stakeholders, and the collective performance and success of the regulated industry and regulatory regime.

Social learning and teaching mainly take place in system 2 and therefore, compared with reinforcement and error-driven learning which is more automatic and unconscious, require the activation of our scarce and not always available cognitive, calculation and strategic thinking resources and capabilities.

- (vi) Employ this learning in order to attempt to alter their regulatory, economic, social, or other environments such as:
 - find more trustworthy friends, colleagues, employers and business partners;
 - adopt new business strategies in order to make the relevant market less competitive and more profitable for them;
 - enter a more promising market and exit a less profitable and predictable market;
 - lobby government for more favorable laws, regulations and compliance and enforcement actions by regulators;
 - punish, ostracize and banish free-riders and non-cooperators;
 - use voice, exit and social media to punish a non-compliant and unethical business and other wrong-doers; and
 - increase enforcement actions and penalties to improve regulatory compliance and performance.

These literatures indicate that: computing and comparing values; making decisions; learning from our experience, successes, mistakes and situations where actual outcomes are very different from our expectations; and applying our learning to change our environments; require a great deal of effort, time, and attention span, and significant contributions from the emotional responses, professional and other intuitions, and moral and other instincts in system 1,

and the scarce and at times inattentive and unavailable cognitive and moral reasoning and benefit-cost type calculations in system 2.

These literatures also emphasize that – when regulatory and other actors are functioning in market, regulatory, social and other environments that are characterized by substantial “social interaction”, complexity, ambiguity, unpredictability, information asymmetries and failures, fear, anxiety and stress – the contributions from the system 1 and 2 regions and the interactions, competition and conflicts between them take on even greater importance; and the risk, frequency and consequences of valuation, decision-making, and learning errors become even greater.

These neuroscience insights on valuation, decision-making and learning could be taken into account in future regulatory research noted in other sections of this and other working papers of the author and his colleagues on:

- (i) the importance of shared information, values, learning, “mental models” and responsibilities regarding the regulatory regime across all regulatory actors – in order to promote regulatory compliance, performance, and the achievement of shared objectives and the public good;
- (ii) how regulatory authorities can carefully use framing, priming, cues, “nudges” and related insights from behavioral economics and neuromarketing to influence and “guide” the decisions of regulated entities and other market participants in a more pro-compliance direction;
- (iii) how these same insights when combined with efforts to make laws, regulations, and regulatory functions more transparent and easier to understand and comply with – and to make regulatory compliance easier, simpler and more automatic, habitual and routine – can reinforce the intrinsic incentives and motivations to comply of regulatees, and help to make compliance the default option for regulated entities that already have reasonably good compliance records; and
- (iv) how adding strategic complexity and ambiguity to a regulatory regime – that is dominated by non-compliant regulatees and other entities on the “slippery slope” to the regulatory bottom – would force these regulatees to think harder about the true and full opportunity costs of non-compliance;

and would hopefully force them to use more of their system 2 cognitive and moral reasoning resources to carefully assess their value systems and decision options; and make more difficult and complex decisions that involve self-regulation, enhanced cognitive control of their non-compliance emotions and instincts, and resolving reputational and identity conflicts within themselves as well as conflicts with other regulatory actors and groups.

3.12 ... More on Valuation, Decision Making and Learning in Complex Regulatory Systems

Regulatory regimes, systems and environments are complex systems, which are expanding in scale, scope, complexity and ambiguity as regulatory regimes are modified and expanded in order to:

- address novel and unfamiliar forms of non-compliant entities and conduct and regulatory harms;
- cover additional and less familiar companies and other regulated entities;
- address additional policy objectives and regulatory harms;
- replace rules-based with principle-based and outcomes-based approaches; and,
- become increasingly inter-connected and networked at the global scale.

The implications and consequences of more complex regulatory regimes are associated with three considerations.

First, with the partial exception of regulatory authorities, regulatory compliance, performance and outcomes are part-time jobs and secondary considerations and priorities of regulated entities, their senior executives, and their supply chain and other business partners. Regulatory conduct and outcomes are as well secondary considerations for the majority of final consumers, civil society groups and other regulatory actors.

And even for regulatory departments and agencies, their senior executives have other functions, responsibilities and priorities, including: serving the needs of their bureaucratic and political masters; financial, governance, and management accountabilities to governments and taxpayers; human

resource planning; and their other functions that are only indirectly related to regulatory compliance and performance.

Second, the insights from behavioral economics, neuroeconomics and neuroscience indicate that, compared with simple systems involving relatively few variables and participants, regulatory systems characterized by complexity, unfamiliarity, ambiguity, novelty and significant interaction between regulatory actors can:

- Generate substantially more information and stimuli to be processed by the human brain.
- More often generate emotional, instinctive, impulsive and other system 1 responses that can be inappropriate and flawed and can lead to more frequent decision errors.
- Place a greater burden on scarce system 2 cognitive resources in order to process the complex and ambiguous information from the complex regulatory system and correct the flawed heuristics, instincts, intuitions and judgments from system 1.
- Generate more complex regulatory and related economic and social decisions that encompass: social preferences and norms and compliance with formal, informal and personal rules; and more situations that involve uncertainty, risk, ambiguity, probabilities and intertemporal choices; and require enhanced self-control, self-regulation, and emotional self-awareness, and contributions from competing decision-making systems and scarce cognitive resources and computational and cognitive control processes.
- Result in greater efforts to avoid aversive situations and outcomes and related errors by more loss and risk averse regulatory actors; and in more high risk decisions and related errors by other regulatory actors with stronger appetites for risk, ambiguity and novelty (see below).
- Generate greater fear, stress, anxiety, and related extreme emotional reactions among many if not most regulatory actors, which can further impede cognitive functioning and result in decision errors – with the exception of regulatory actors with a strong appetite for risk who enjoy functioning in complex, ambiguous, novel and unfamiliar systems and environments and are able to capitalize on the biases, fears, anxieties and related vulnerabilities of others.
- Generate mixed, ambiguous and confusing signals, messages and information on anticipated and actual rewards from compliance and on anticipated and actual punishments from non-compliance – which often would need to be identified, processed and assessed mainly by the cognitive and moral reasoning and other scarce system 2 resources and regions of the human brain.
- Increase the tendency of the human brain to wrongly categorize and simplify complex cause and effect situations – often in a self-serving manner – especially when cause and effect relationships are non-linear and multi-dimensional and final effects and outcomes have several causes.
- Accelerate the decline in the number of “true experts” in the regulatory system who recognize their limitations and what they don’t know – which in turn would add to the illusion of control and competence, too much optimism, overconfidence, reference group neglect, and the attribution, confirmation and related biases that influence and distort the decisions of senior executives in regulatory authorities, regulated entities and other stakeholder organizations.
- Provide opportunities, justifications, rationalizations and excuses to regulated entities and their senior executives and other employees for non-compliant and unethical conduct, decisions and strategies – “nobody can comply with such a complex, unpredictable and non-transparent regulatory regime and everybody is doing it”.
- And for these and other reasons can impede reinforcement, error-driven, and other forms of learning by regulatory actors based on their experience, successes, mistakes and situations where actual rewards and punishments are very different from their expectations and predictions.

Cognitive burden and strain and resulting system 1 and system 2 errors can be particularly prominent for regulatory actors that prefer or need to allocate most of their scarce system 2 cognitive resources and system 1 professional intuitions, instincts and judgments to other personal, family, corporate and organizational functions, priorities and imperatives.

Third, because of their focus on experimental and empirical methods, the behavioral economics, neuroeconomics and neuroscience literatures have largely examined simpler systems where the information processing, valuation, decision making

and learning of regulatory and other actors are influenced by examining and/or altering one or a few behavioral biases, heuristics, cognitive attributes in system 1 or 2, and/or contextual parameters, while holding all other variables and parameters constant.

3.13 Understanding How Regulatory Actors Function Within More Complex and Chaotic Regulatory Regimes and Systems

As a consequence, less research has been conducted by these behavioral and neuroscience scholars on more complex, ambiguous, novel, and dynamic systems where information processing, valuation, decision making and learning in the human brain are influenced by the interactive, cumulative, network, conflicting, and feedback effects of many informational, behavioral, cognitive, contextual and other variables.

The expectation in these literatures is that better knowledge of simpler systems would provide insights that could be extended to investigations of more complex systems in the future. However, while insights on simpler systems can be helpful, we have also learned that the attributes and dynamics of complex systems can be very different from those of simpler systems. There are many differences between more complex and simpler systems that could be important to regulatory regimes, environments and actors. Compared with simpler systems, more complex systems:

- (i) do not follow a blueprint with simple and uni-dimensional cause and effect relationships that operate in a single direction;
- (ii) are more adaptive, dynamic, “organic”, and spontaneous, and more subject to evolutionary, spontaneous, unpredictable, and fundamental changes and shocks through time;
- (iii) can encompass dense relationships, linkages and interconnections (including the strong and weak ties of Granovetter and other economic sociologists) that are incomplete, are variable in strength and relevance, can be based on both emotional and functional considerations, and can be growing or decaying in ways that are not transparent to participants;

- (iv) have much greater network effects and positive and negative externalities, which also are often not evident to participants – leading to much greater potential for consequences that are unintended, unpredictable and unknowable at the outset;

including in some contexts very unpleasant regulatory, market, economic, social, environmental and other “surprises” that were never anticipated; and in other contexts degrees of fairness, trust, cooperation, and compliance with laws, regulations and social norms that are also unanticipated and much greater than predicted by the rational agent and choice model of conventional economics;

- (v) and at times can evolve towards a “chaotic out-of-control system” when the patterns, regularities and linkages within the system can no longer be identified and assessed by participants and outsiders.

The interactions between complex regulatory systems and the complex processes within the human brain that are needed to process and interpret and make decisions on the complicated and ambiguous information, cues and related stimuli generated by complex systems, can result in unanticipated and unpredictable regulatory conduct, decisions and outcomes – which in some contexts can favour compliance and make compliance routine, conventional and the default option; and in other contexts can generate non-compliant, unethical and illegal conduct and decisions and systemic and egregious regulatory harms.

One of the potential advantages of a more complex regulatory system, which for example:

- is principles-based and outcomes-based,
- has “polycentric sustainable governance” attributes,
- and is characterized by shared information, learning, mental models and responsibilities for compliance and performance across regulatory actors;

is that the system may have many options and the necessary redundancies and what the complexity literature calls “degeneracy advantages”, which are needed to sustain regulatory compliance and performance and achieve public interest objectives despite fundamental internal and external changes.

If some of the previous linkages and interrelationships,

such as between regulatory authorities and regulated entities, experience decay because of reductions in their regulatory budgets, resources, and interest, regulatory compliance and performance can be sustained in some complex regulatory systems:

- (i) through the threat of exit and voice by final consumers, business customers and other market participants,
- (ii) by means of naming and shaming by the media and civil society groups,
- (iii) through normal market forces of entry, exit and expansion by more compliant, ethical, efficient and innovative companies that prosper in a more socially responsible environment; and,
- (iv) because compliance has become the norm, convention, and default option of the regulated entities;
- (v) and has become embedded within their corporate cultures, and the brains and consciousness of their senior executives and other employees.

Nonetheless, the responses of regulatory actors to complex systems will vary depending on context and the attributes of individuals and organizations. Some regulatory and economic actors, who have better than average creative thinking, imaginative capacity, and experience working in complex, novel, unfamiliar, ambiguous and “noisy” environments, can become excited, energized, motivated and creative when they are functioning within complex, ambiguous and novel market and regulatory environments.

While for other individuals and their brains, they would be threatened and “shocked” by complex systems, contexts, opportunities and challenges – which at times are so novel and unfamiliar that information and other stimuli cannot be successfully interpreted, processed and categorized by the human brain and placed in their memories. As a consequence, the emotions, instincts, and other system 1 attributes take over, and system 2 cognitive and moral reasoning and calculation are not available and functioning.

Expanding complexity, unpredictability, ambiguity, and novelty, and the resulting impacts on cognitive functions, can help to explain the conduct, decisions and errors of regulatees, regulatory authorities, and victims during the lead up to the corporate governance scandals, the collapse of the American subprime mortgage market, the global financial crisis, and other regulatory incidents and disasters of the last three

decades. The law and economics, regulatory and behavioral literatures suggest that the brains of many regulatory actors were essentially on “automatic pilot” during these regulatory episodes.

Furthermore, complex systems and environments may help to explain and justify the responses of regulated entities and other regulatory and economic actors. The state-owned, family-owned and privately-owned business groups, networks and eco-systems and other more complex corporate entities – which as discussed earlier are prominent in many of the emerging market economies, and are now becoming more active in OECD country and global markets – can arguably be better perceived and interpreted:

- as understandable and legitimate responses to their complex home environments and the challenges of “going global”;
- rather than as attempts to increase and exploit market power and exploit more vulnerable regulatory actors such as final consumers, smaller suppliers and business customers, and minority shareholders.

Finally, combining complex regulatory systems with the complexities of the human brain illustrates some of the limitations of more conventional economics, econometric and related models and methods to developing a better understanding of regulatory preferences, conduct, compliance and performance in increasingly complex, inter-connected and networked national and global regulatory regimes.

The application of system dynamics and related simulation, agent-based and complex network theory based analytical frameworks and models may be the preferred approach for assessing complex regulatory systems and their interactions with the various regions of the equally complex human brain. These less conventional frameworks and models facilitate the analysis of complex systems with multiple parameters, players and interactions, and can be developed through bringing together the insights from multiple literatures in economics, sociology, political science, neuroscience, system dynamics, chaos theory and other fields.

In particular, recent advances in social neuroscience on the social brain, social cognition, within group loyalty and cooperation, intergroup cooperation and conflict, and “insider versus outsider” perspectives indicate that system dynamics and related models of the “human brain” operating within and interacting with other human brains in regulatory regimes, are better

able to take account of the dynamism, complexity, unpredictability, and ambiguity of the regulatory environment and of the business, personal and other social interactions between regulatory actors.

As noted before, the dynamism, complexity, unpredictability and ambiguity of regulatory environments may be much greater than for the “non-social contexts” of individuals that involve limited interaction with others, and arguably for many if not most other market, economic and social environments.

4.0 Eight Cross-Cutting Issues for Future Research

As noted in the Introduction, this Issues Note and our research and working papers on regulation, behaviour and the human brain have identified eight cross-cutting issues that need to be explored in greater detail in future research that applies behavioral economics, neuroeconomics and neuroscience to regulatory regimes, contexts and actors.

- 1) The extent to which “irrationality” and our information, cognitive, self-control and related limitations distort our preferences, choices, decisions, learning, and well-being, continues to be debated and to some degree remains unresolved within the behavioral economics, neuroeconomics and neuroscience literatures.

The underlying premise and working hypothesis of the working papers and research program of the author and his co-authors and colleagues are that individuals and by extension regulated entities, regulatory authorities and other organizations and regulatory actors are boundedly rational but willing to learn entities that are doing the best they can, and normally make reasonably satisfactory choices and decisions despite their information, time, energy, interest, attention span, cognitive resource and other constraints.

This underlying premise is just as relevant to (i) senior executives of major corporations, government ministries and regulatory authorities, who can be overly impressed by and too confident in their “superior” knowledge, expertise, education, acumen and other personal and organization attributes; as (ii) the more vulnerable and disadvantaged final consumers, small businesses and other market participants who are not “victims” but instead are aware of

their challenges and limitations, learn from their purchases and other successes and errors, and are developing and applying coping skills and strategies.

- 2) Recent advances in behavioral economics and especially in neuroeconomics and neuroscience are consistent with and validate many of the core principles, concepts and premises of the more conventional economic literatures regarding for example fair competition, scarcity, incentives, gains, losses, rewards, punishments, utility, disutility and the pleasure/pain principle of Jeremy Bentham.
- 3) However, behavioral economics, neuroeconomics and neuroscience apply the satisficing principle of Herbert Simon rather than the optimizing principle of conventional economics; extend the concept of scarcity to time, interest, attention span, and the cognitive resources of the human brain; and expand gains and losses to encompass non-financial and intangible incentives, rewards, punishments, pleasure and pain that e.g. are associated with our business, economic and social relationships with other people including within firms and other organizations and between business partners within supply chains, business groups, networks and eco-systems, and regulatory regimes.

More research is needed on how these differences with more conventional economic and regulatory literatures – and in particular the neuroscience insights on how the human brain processes information and other stimuli on financial, non-financial and social rewards and incentives – can be employed to enhance the design, implementation and effectiveness of laws, regulations, regulatory functions, and the information, messages and “signals” provided by regulatory authorities to regulated entities and other regulatory actors.

- 4) Recent advances in social neuroscience on social cognition and the “social brain” underline the importance of market, economic, social, and regulatory contexts to: the values we place on goods, services, less tangible objects such as our reputations, and our other assets and “endowments”; the choices and decision options that are available to us; the decisions we make, and how we learn from our experience, successes, mistakes and “prediction errors”.

- 5) Behavioral economics, neuroeconomics, social neuroscience, and other less conventional economic literatures better explain the role of path dependence in making regulatory compliance routine, conventional, and the default option for many regulated entities and regimes to the point where compliance continues after major reductions in regulatory budgets and other external shocks; and in placing some other regulated entities and regimes on the non-compliance trajectory to the regulatory bottom.

Knowing where the regulated population and other regulated entities are located on this compliance/non-compliance continuum is essential for regulatory authorities and other regulatory actors. Particularly relevant in this regard are the insights from social neuroscience, social cognition and the social brain which can be used to compare regulatory regimes that have strong within group loyalties and identities that are shared by and cut across regulatory actors; with regulatory regimes where insiders (us) versus outsiders (them) attitudes and hostilities dominate and distort the relationships between regulators and regulatees, between regulatees and their final consumers and business customers, and between regulated entities and civil society groups.

- 6) Different regions of the human brain process information and other stimuli on extrinsic versus intrinsic incentives and motivations. As a consequence, behavioral economics, neuroeconomics and neuroscience provide important insights on:
- (i) how principles-based and outcomes based regulatory philosophies, approaches and regimes, when combined with
 - (ii) the appropriate design, implementation and framing of regulatory functions, strategies and messages; and
 - (iii) regulatory authority efforts to make compliance less costly and burdensome, easier and more routine for regulatees;

can enhance the intrinsic incentives and motivations to comply of regulated entities, and minimize the danger that extrinsic rewards and punishments and other externally applied and imposed incentives, will demotivate regulatees and dampen their intrinsic incentives and

motivations to comply with laws, regulations and social norms.

- 7) Regulatory authorities, actual and potential victims of non-compliant conduct, civil society groups and other regulatory actors need expanded insights and guidance from the behavioral and neuroscience literatures on how **the potential punishments from many sources and the true and full opportunity costs** of non-compliance can be made:

- as real, salient, vivid, “immediate”, and certain as possible,
- as easy to recall, imagine and contemplate as possible, and
- to carry as much emotional and cognitive weight as possible.

This research and guidance is especially need regarding the villains and bad apples of the regulated population and for other regulated entities that are starting down the slippery slope to the non-compliance bottom of the compliance/non-compliance continuum. For example, behavioral and neuroscience research has found that anticipated and actual financial penalties, social rejection and exclusion and a variety of other anticipated and actual aversive outcomes activate the same regions of the human brain as physical pain.

These insights suggest that regulators and others could potentially apply a variety of potential (threats of) and actual penalties e.g. financial penalties, naming and shaming, exclusion from mutually beneficial policy consultation, standards development, voluntary regulation and other processes, in complementary, strategic and cumulative ways – in order to ensure that systemic and egregious non-compliance causes as much pain as possible from as many sources as feasible to the villains and bad apples of the regulatory landscape.

- 8) System dynamics, simulation and other less conventional models and analytical and conceptual frameworks can play an important role when analysts and others need to explore and increase their understanding of:
- (i) the many and diverse interactions between the complex human brain and the increasingly complex, ambiguous and inter-connected

regulatory regimes and systems that e.g. encompass multiple regulatory authorities and other stakeholders from many countries and jurisdictions at the global scale;

- (ii) and what these interactions indicate for the extrinsic/external, intrinsic, and image based incentives and motivations of regulated entities and others to contribute to the public good of complying with laws, regulations and social norms.

System dynamics and related research, approaches, and models that address the interactions between the complex human brain and complex regulatory systems could be especially important to determining whether the major insights from the behavioral and neuroscience literatures on for example:

- our behavioral biases, aversions, and “fast and frugal” heuristics,
- reference dependent preferences, decisions and utility from outcomes,
- and the many other behavioral, emotional, intuitive, instinctive, cognitive and other attributes of individuals and organizations that are explored in this Issues Note and research program;

will on balance operate together to promote or harm regulatory compliance and performance in the increasingly complex and interconnected regulatory regimes and systems of the future.

Future research from a regulatory perspective on these eight cross-cutting issues can make a major contribution to enhancing regulatory compliance and performance and improving the design, implementation and “framing” of the policies, laws, regulations and regulatory functions and messages of governments and their regulatory authorities across a broad range of economic, market, social, environmental and other regulatory regimes.

5.0 Concluding Comments

Regulatory regimes are complex systems that:

- (i) encompass multiple regulatory actors, players and stakeholders with diverse interests, incentives, motivations, goals and backgrounds;
- (ii) which are often not obvious and known to

other participants and at times to the regulatory actors themselves because of the importance of emotions, intuitions, instincts, inferences, interpretations of information, and other more automatic and unconscious system 1 attributes to regulatory preferences, choices, decisions and learning.

Furthermore, many regulatory regimes are becoming increasingly complex, ambiguous and unpredictable through time as a consequence of globalization, the knowledge based economy, the participation of new regulatory actors and players from emerging market and developing economies, the growing popularity of principles-based and outcomes-based regimes, and the other national and global trends explored in the research program of the author and his many co-authors.

The brain as well is a highly complex system where valuation, decision making, learning and other cognitive processes that are important to regulatory compliance and performance can involve interactions, competition and conflicts between many different regions of the brain in ways that neuroscience methods and scholars have only partially identified and resolved.

When the complex human brain interacts with complex regulatory systems and regimes, complexity, ambiguity, unpredictability, and the risk of Type I and Type II and other regulatory errors are amplified and often at an exponential rate.

These and other themes and insights from the behavioral, neuroeconomics, neuroscience and related less conventional literatures are noted and expanded on throughout the main text of this working paper as well as other working papers prepared by the author and his colleagues that are referenced in the bibliography.

Exhibit II at the end of this Note provides an overview conceptual “schematic” of how the two systems of the human brain interact with each other and the regulatory context and environment to determine the preferences, conduct, decisions and learning of regulatory actors. This conceptual schematic attempts to capture from a regulatory perspective:

- (i) The respective roles and importance of system 1 versus system 2 thinking from the neuroeconomics and neuroscience literatures.
- (ii) The interactions between the two systems of the human brain – which include the competition and conflicts that take place in various regions of the brain between social rewards (doing the

right thing and complying with laws, regulations and social norms) and monetary rewards (from compliance or non-compliance depending on the firm, market, industry, and other contexts and parameters discussed in this and other working papers).

- (iii) The early warning system of system 1 emotions, intuitions and instincts, which send a signal to system 2 that a regulatory issue is not routine and familiar, but rather is complex, unfamiliar, novel and potentially threatening, and requires system 2 attention, cognitive resources, cognitive and moral reasoning and rational benefit-cost type calculation.
- (iv) How system 2 at times (but not always) controls and corrects the system 1 emotions, intuitions, heuristics, interpretations, judgements, and errors – when e.g. the cognitive functions cannot override the addictive power of money in system 1.
- (v) How the system 1 and 2 preferences, conduct and decisions are filtered through and influenced by the behavioral biases and flawed heuristics of behavioral economics (this presumption and relationship requires much greater theoretical, empirical, and experimental research from a regulatory perspective in all behavioral economics, neuroeconomics and neuroscience literatures).
- (vi) How the system 1 and 2 preferences, conduct and decisions are filtered through and mediated and influenced by market, regulatory, social, cultural, organizational and other contexts – in a manner than can either augment or diminish the extrinsic and intrinsic incentives and motivations, and system 1 and 2 processing of information and thinking, to comply with laws, regulations and social norms.
- (vii) How system 1 and 2 thinking and processing, behavioral biases and flawed heuristics, and the contextual effects and filters, come together to influence and determine regulatory preferences, conduct, actions, compliance, outcomes and performance.
- (viii) How regulatory experience, conduct, actions, outcomes, successes and mistakes, and the interactions between regulatory actors, facilitate system 1 and 2 learning in different ways; have

debiasing and learning effects and benefits on the behavioral biases and flawed heuristics of regulatory actors.

And can also have impacts on and facilitate pro-compliance or anti-compliance changes to market, regulatory, organizational and other contexts, which in turn influences the learning and future preferences, conduct and decisions of regulatory actors; and thereby closes the loop between preferences, conduct, decisions, experience, context and learning within the complex, interactive and comparatively (but not totally) “closed” regulatory system.

- (ix) And in some regulatory and market contexts may help to make regulatory compliance and exceeding regulatory requirements and obligations the norm, convention and default option in regulated firms, industries and markets and other regulated entities.

As illustrated in an admittedly simplified manner in the conceptual schematic in Exhibit II, the interactive, cumulative and feedback effects between the complex “emotional/social/economic” brain and complex regulatory environments, whereby:

- the human brain interacts with, responds and adapts to, and learns from regulatory contexts and environments, and
- uses that learning to alter these environments in a manner that shapes and can enhance the cognitive functions of the human brain in the future;

play a major role in influencing and determining regulatory compliance, outcomes and overall performance.

These interactive, cumulative and feedback effects, which are captured in the extensive use of two-way arrows in Exhibit II, help to explain how and why path dependence in some contexts can place some regulated entities on the slippery slope to the non-compliant regulatory bottom; and in other contexts can sustain compliance and even compliance beyond regulatory requirements after regulatory budgets are sharply reduced and other external shocks – which otherwise would be predicted to significantly increase non-compliance and regulatory harms.

As noted at the outset, neuroeconomics and neuroscience have given relatively limited attention to cognitive functions and the design and implementation of policies, laws, regulations, programs and other

government initiatives. The major exceptions are recent neuroeconomics research on the causes and consequences of the American subprime mortgage market collapse and the global financial crisis; and the work of a few scholars on behavioral public economics.

Moreover, the more extensive behavioral economics literature on policy, legal and regulatory matters too often presume that behavioral biases, flawed heuristics and other forms of irrationality are relevant only or mainly to final consumers and other more vulnerable regulatory and economic actors – and that regulatory authorities and larger regulated entities are influenced very little by biases, heuristics, social norms, other-regarding preferences, and lack of self-control.

The regulatory and related interpretations and inferences developed by the author from the behavioral economics, neuroeconomics and neuroscience literatures suggest that regulatory actors, regimes, compliance and performance would especially benefit from future behavioral and neuroscience research on whether, how, why and under what circumstances:

- 1) Offsetting biases and the debiasing and learning benefits from higher quality and more frequent interactions between regulatory actors would enhance regulatory compliance and performance – as predicted for polycentric and related multi-stakeholder governance and regulatory models.
- 2) System 1 emotions, instincts, intuitions, inferences, and “fast and frugal” heuristics of regulated entities and other regulatory actors would promote compliance, non-compliance, or contingent context-dependent compliant and non-compliant conduct and decision making in the middle of the compliance/non-compliance continuum.
- 3) The expanding complexity, ambiguity, and globally inter-connected nature of regulatory regimes, systems, environment and contexts would encourage preferences, conduct, decisions, and learning by regulated entities and other regulatory actors that on balance would promote regulatory compliance and performance.
- 4) Positive messages on the financial and non-financial rewards and payoffs from compliance, negative messages on true and full opportunity costs and related aversive outcomes from non-compliance, or some well-designed “mix” between the two, should be emphasized when regulatory authorities design, implement and

“frame” their policies, laws, regulations, and regulatory functions, strategies and messages – leading to the question of whether and how the insights from “neuromarketing” should be used by governments, regulatory authorities and other non-regulatee regulatory actors.

- 5) The anticipation and threat of financial and non-financial rewards, incentives, payoffs, gains, losses and punishments should be given greater emphasis compared with the rewards, incentives, payoffs, gains, losses and punishments that are actually experienced, when regulatory authorities are designing, implementing and “framing” their functions, strategies and messages.
- 6) The insights from the three literatures can be employed to reduce the risk (probability and consequences) of Type I, Type II and other regulatory errors – through e.g. developing a better understanding of the incentives, motivations and cognitive functions of more risk- and novelty-seeking, dynamic, entrepreneurial, innovative and creative individuals, existing companies, new entrants, industries and markets – including maverick producers and other smaller competitors that have the capabilities, smarts, will, and courage to be an “outlier” and discipline the conduct of large and well-established incumbents.
- 7) The three interrelated dimensions of regulatory complexity and the human brain, that is, the complex interactions between the complex human brains of regulatory actors and the increasingly complex and ambiguous regulatory regimes and contexts, encourage extrinsic and intrinsic incentives and motivations to comply, and at times regulatee compliance that goes beyond the regulatory requirements, obligations and duties.

Exhibit II: Conceptual Schematic of the Implications of System 1 and 2 for Regulatory Conduct, Compliance, Decisions, Outcomes, and Performance

