

**Title: A subjective expected utility framework for the analysis of behavioral food risks**

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**Abstract:** Production misbehavior increases the risks of adverse outcomes for buyers and consumers. These outcomes represent negative externalities caused by the breaking of rules designed to prevent them. The probability of misbehavior increases in line with the benefits for its authors. It decreases in line with the probability and level of sanctions as well as with the effectiveness of social norms supporting the rules. This paper contributes to a better understanding of behavioral risks by developing an analytical framework for the study of economic misconduct. It also discusses how this framework can contribute to a performance analysis of institutional “solutions” that have been found for behavioral risks.

**Keywords:** behavioral food risks; food safety regulation; subjective expected utility, smart regulation

## 1 Introduction: Moral hazard and behavioral risks in economic relationships

Risks stemming from production may be caused by *technological hazards*, i.e. a genuine lack of knowledge about the stochastic effects of complex production systems or safety breakdowns and technical failures. They may also be caused by *deviant economic behavior*<sup>1</sup> (including white collar crime, cf. Entorf and Spengler, 1998; Friedrichs, 2003; Sutherland, 1949, 1979) of self-interested actors who break contractual and/or legal rules<sup>2</sup> such as those aimed at protecting consumers' health and the environment. Food producers might, e.g., exploit the fact that, due to *information asymmetries*, neither their production activities nor the resulting food properties can be directly observed by buyers (be they downstream food businesses, consumers or other stakeholders). Price spreads for different quality categories and/or the *costs of compliance* with public and/or private quality and safety standards may tempt self-interested producers to exploit such information asymmetries.

From an informational economics point of view, asymmetric information regarding a product's properties and attributes can be described by the term *credence quality*. Credence qualities do not only refer to *quality risks* of being deceived regarding the underlying production processes or a product's properties and contents (e.g., deer vs. kangaroo meat). They also refer to *safety risks* that are caused by the use and consumption of products that contain contaminants and pathogens. While entailing irregular technological practices and leading to downstream diseconomies or social damages (*negative externalities*) such as consumers' exposure to increased residue levels or environmental pollution, the threat of self-interested, *opportunistic malpractice* has been labeled *moral hazard* by game theorists, stressing both the original cause of these risks and the direction of potential countermeasures.

The probability that quality and safety threats or other undesired production outcomes (here jointly referred to as *behavioral risks*) are caused by malpractice rises in line with the profits that can be earned from opportunistic acts. Hennessy et al. (2003), concerning themselves with the agro-food sector, conclude that *misdirected incentives* are a major source of food risks, and that, in present-day supply chains, there are relevant constellations where *intransparent markets* and malfunctioning regulation make non-compliance more

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<sup>1</sup> We are interested in deviant economic behavior of any kind. We thence use the terms "economic" (business/corporate/white-collar) in conjunction with the terms "malpractice" (deviance/misbehavior/offence/crime) largely as synonyms to denote self-interested misconduct of one or several actors engaged in bona fide organizations such as conventional businesses or legitimate professions. They are *not* used as strict definitions to discriminate between different types of offenders and activities or their criminal status.

<sup>2</sup> Unintentional human failures and incompetence can also result in rule violations and cause behavioral risks. These types of risk are not the focus of this paper.

profitable than compliance. This, in conjunction with opportunism, gives rise to negative externalities and the *failure of markets*<sup>3</sup> since deviant firms can outperform rule-abiding competitors. However, individuals may react differently to economic temptations due to different levels of *protective factors* (bonds to social norms such as values, emotions, community pressure etc.) that back up the rules (cf. Lösel and Bender, 2003). Protective factors can be seen as limiting the actors' freedom to break the rules (Tittle, 1995, 2000), or as forming the non-economic components of the actors' preferences (e.g., ones influenced by notions of fairness or altruism).

Economic crimes such as corruption, abuse of public office, and white collar crime in the financial sphere (insider trading, money laundering etc.) are widespread and score high on the agenda of various civil society organizations (cf. e.g., Transparency International, 2008), international bodies (cf. e.g., the World Bank's Governance and Anticorruption Newsletter), and national and trans-national anti-fraud and criminal investigation offices (cf., e.g., BKA, 2008; OLAF, 2008). Infringements of production-related rules – possibly with the recent exception of environmental crime – have as yet not attracted a high level of systematic attention.

When interpreting business crime statistics, the essential features of economic crimes should be recognized: unlike “traditional crime” which itself is evident, business crime frequently remains covert. Its adverse effects are often widely dispersed over time and space, and thus “relatively invisible” (Croall, 1993); i.e., it is not only difficult to detect the offender, but it is difficult to detect the offence in the first place. It is also difficult to detect the crime's victims, its date, location and the magnitude of damages afflicted on the victims. Furthermore, the (criminal) status of an economic offence is often ambiguous and the responsibility of its authors is frequently diffuse. On the one hand, this is caused by the complexity of economic offences and the delegation of responsibilities within organizations; on the other, this is due to corporate cultures which promote illegal practices without needing orders and which welcome illegal practices as “problem solutions” instead of rejecting them as unacceptable violations.

The relative *invisibility of economic misconduct* in conjunction with its *ambiguous criminal status* and the *diffuse responsibility* allow offenders to see themselves as honest/respectable persons by rejecting any charge that they are personally responsible or that a harm is done (cf. Szwajkowski, 1992). In connection with this, social norms that could support the formal rules and act as

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<sup>3</sup> Equating rule-breaking with market failures requires the assumption that rule-compliance would prevent such failures, i.e. that the social gains from rule-breaking do not exceed its social damage. In this paper we do not concern ourselves with the question whether the rules that prescribe certain types of individual action are indeed (Kaldor-Hicks) efficient in that they raise the wealth of the available social resources. Instead we limit our perspective to the question of how successful society is in making people abide by its (presumably efficient) rules.

protective factors tend to be weak. This applies especially to corporate misconduct if none of the executives is individually accountable. The lack of protective factors is enhanced if misconduct causes “only” an increased probability of adverse outcomes, and if these outcomes are disputable or if they constitute “only” fraud without anybody suffering a “real damage” (e.g., mislabeling regarding a product’s geographic origin or its weight).

Despite a growing societal awareness of substandard food production practices and crimes against consumers, there is a lack of applied *behavioral analyses* which consider the *individuals’ multiple goals* and the interacting situational factors. Instead of focusing on objective facts and wealth-maximizing actors, the understanding of the phenomenon “misconduct” requires that the actors’ options of choice and their calculi are reconstructed according to their subjective preferences, perceptions and evaluations (*reconstructing understanding*). “These need not necessarily represent the physical rules of the world (Rubinstein, 1991: 910).” Instead, one needs a *bounded rational choice* model which tackles the gap between rational choice predictions and actual behavior (cf. Garoupa, 2003) and which reflects behavior as a result of what the individual sees as procedurally reasonable in the light of the available information and his information-processing capacities (cf., e.g., MacLeod, 2003; Simon, 1986). It should consequently consider the individual’s selfish *and* altruistic preferences and the trade-offs between them (cf., e.g., Margolis, 1982). Since applied studies of what makes food producers break (or not break) rules in their social and economic contexts are as yet scarce, knowledge gaps persist regarding effective governance and the design of regulatory strategies.

Given this background, section 2 outlines our conceptual starting point by providing a definition of governance and regulation. Section 3 provides a brief overview of various contributions that have been made to the study of economic misconduct. In section 4, we develop an *analytical framework* for the study of behavioral risks and deviant economic behavior. The framework, which is based on a *subjective expected utility* perspective in a broad sense<sup>4</sup>, represents a theoretical contribution to the understanding of economic deviance. Starting with a dichotomous categorization of motivations into material and non-material<sup>5</sup> ones, it provides a classification scheme of factors that rep-

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<sup>4</sup> This reflects the belief that economic behavior may be complex but not random or unpredictable (Garoupa, 2003: 6). The term “subjective expected utility analysis” is to emphasize that we consider bounded rational *and* multi-goal decision-making. Whilst including psychological utilities and disutilities resulting from value orientations, we do not elaborate on the concept of risk utility and its dependence on the actor’s risk perception and risk attitude. The extent to which actors dislike the volatility of their goal achievement (Mahul and Pennings, 2004) are implicitly considered in the various utility components which we distinguish.

<sup>5</sup> Throughout this paper, the terms “material” and “economic” are used as interchangeable synonyms to denote goals/payoffs in terms of money or physical resources as opposed to non-

resent potential behavioral determinants. Section 5 concludes with an outlook of how the framework can contribute to institutional performance analysis in the food sector.

## 2 Governance and regulation – a conceptual definition

In the words of Braithwaite (2007: 1) we may state that “few projects are more central to the social sciences than the study of regulation and regulatory governance.” However, neither a uniform set of questions nor a consistent set of definitions are associated with these terms across social science disciplines such as microeconomics, management sciences, political sciences, criminology, social psychology, sociology etc. This has led to a conceptual confusion impeding interdisciplinary cooperation in this central social science project.

Avoiding an inevitable piecemeal discussion of historical developments and conceptual differences that exist between different social science disciplines concerned with regulation, we provide a hopefully integrative conceptual definition that outlines the subject and the aims of this project. To do so, we first of all distinguish governance from regulation. Following Braithwaite (2007) we conceive of *regulation* as a narrower term than *governance*. Whereas governance is about providing, distributing *and* regulating, “regulation can be conceived as that large subset of governance that is about steering the flow of events and behavior, as opposed to providing and distributing (Braithwaite, 2007: 3).” While reference could be made in principle to the regulation of any kind of social behavior, the term regulation is more particularly used in relation to economic activity (Picciotto, 2002). This includes efforts to influence the behavior of economic actors by *making failing markets work*<sup>6</sup>. Based on this definition, we can distinguish three regulatory dimensions: (i) the type of the regulator-regulatee relationship, (ii) the regulatory regime, and (iii) the regulatee’s behavioral determinants.

Regarding the *regulator-regulatee relationship*, we abandon a perspective that focuses exclusively on actions by governments. Instead, we see economic actors as being regulated by a mix of *public-private co-regulation*<sup>7</sup> which is brought about by a *regulatory network* of various governmental agencies and non-governmental actors including the market participants, corporate business associations, NGOs and special interest groups (cf. Ostrom, 2005).

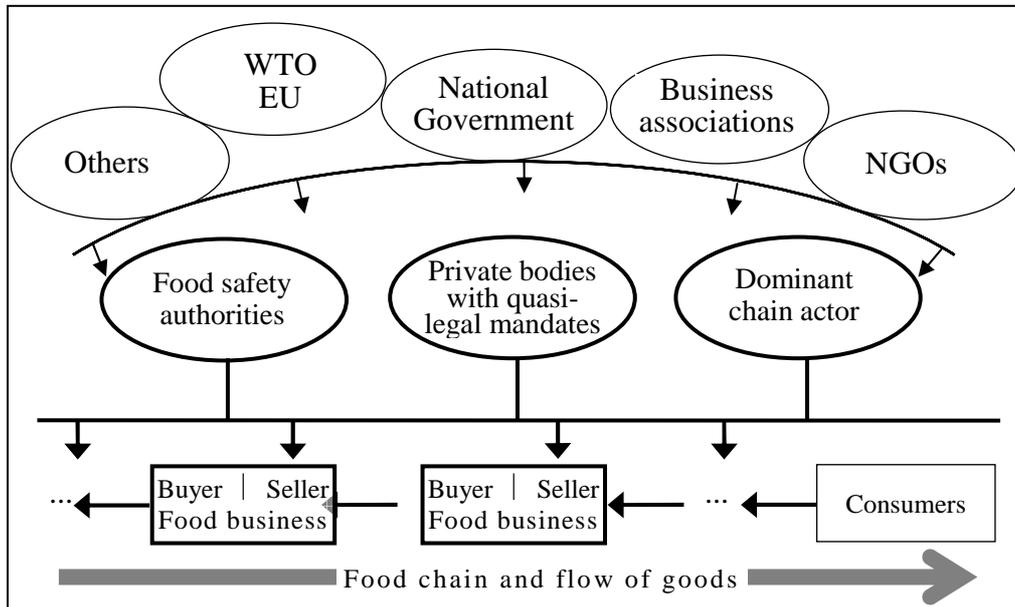
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material (normative) motivations arising from an individual’s value system and social contexts (e.g. pride, guilt, social respect).

<sup>6</sup> Contrary to widespread associations in mainstream economic liberalism, we do not equate “regulation” with distorting government interventions (e.g. protectionist price setting) that *make working markets fail*.

<sup>7</sup> Regulatory efforts of public bodies, on the one hand, and private ones, on the other, are sometimes distinguished by using the term “corporate regulation” as opposed to “behavioral management”. The underlying objective, however, is quite identical: the party with the coarser information partition tries to manage relational risks and steer behavior.

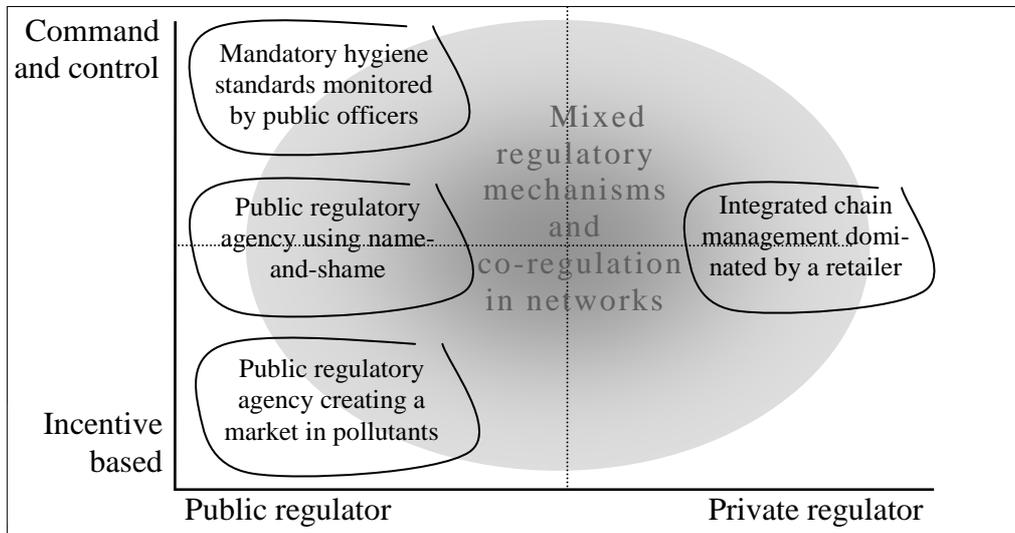
**Figure 1: A simplified structure of regulation in the food industry**



The food sector provides a good illustration (cf. Martinez et al., 2007). Abstracting from complex interdependencies, Figure 1 focuses on the seller-buyer dyad in a food chain. The arrows indicate the direction of the regulatory influence: food safety authorities aim at ensuring business behavior along the chain which adheres to public standards and does not produce negative externalities. Additionally, food businesses want their suppliers to adhere to specified private standards. In some cases, there might exist an integrated chain management and a “dominant chain actor” (e.g., a retail chain) which aims at regulating the behavior of all actors along the supply chain using private standards in order to obtain competitive advantages on the market with a premium label (cf. Vetter and Karantinis, 2001). There may also be private bodies (e.g., certification and testing institutes) which have public (quasi-legal) mandates. Finally, all the chain actors including consumers and the direct chain regulators are interlinked with governments, business and consumer associations and bodies concerned with the harmonization of production and trade standards on the cross-national and international level (e.g., EU, WTO).

The *regulatory regimes* that are in force to steer the behavior of economic actors can be systematized according to whether they primarily aim to impact on the actors’ set of choices or the material and non-material outcomes resulting from these choices. We understand regulatory regimes as a mixture of steering mechanisms that can best be described by the extreme types *command and control* as opposed to *incentive-based motivation* (cf. Figure 2).

**Figure 2: Regulator types and regulatory regimes**



There is no exclusive relationship which links regulatory regimes to certain regulator types. Public regulators regulate via hierarchical command and control as well as via incentives. An example of the former are mandatory hygienic standards that are monitored, enforced and sanctioned by public officers. An example of the latter is the recent creation of a market in pollutants. An example of a mixed regulatory regime are name-and-shame measures that combine public inspection with private (reputational) sanctioning via transparent markets<sup>8</sup>. Mixed regulatory mechanisms are also used by private firms. While they are mostly seen as relying on hierarchical command and control mechanisms within the firm, and on the market for inter-firm transactions, regulatory mixtures are used in both situations: within firms, incentive-based payment schemes complement command and control in many cases and, in the presence of product quality uncertainty, inter-firm transactions are often characterized by regulation mechanisms that are located somewhere on the range between the extreme types control-based and incentive-based. The shaded area in Figure 2 indicates that economic actors are co-regulated by a mixed group of regulators (networks) both from the public and the private sphere, all of which rely on a mixture of regulation mechanisms. However, regulatory contexts differ with regard to the relative impact of diverse regulators and regulatory regimes.

The regulatees' *behavioral determinants* are the expected utilities they subjectively associate with their choices. Even though the probability of malpractice can be conceptualized as varying with its *expected economic benefits*,

<sup>8</sup> Explicit name-and-shame measures are, e.g., used in Denmark where inspectors attach “smileys” to the doors of restaurants and shops which inform the customers about food inspection results (cf. Guina-Dornan, 2007). A smiley system for restaurants has also been introduced in Berlin-Pankow/Germany in the beginning of 2009.

there are different individual reactions to economic temptations due to different levels of *protective factors* which shield actors from rule-breaking. This corresponds to the broad utilitarian view (cf. footnote 4) that human behavior is shaped by a mixture of motivations including altruism and other non-wealth maximizing preferences (cf. North, 1990). Depending on the situation, utility gains from complying with rules may (or may not) outweigh temptations to break them (cf. Pinstrup-Andersen, 2005).

Regulators aim to impact on the behavioral drivers of the actors they want to steer by changing their opportunity sets (e.g., via the introduction of new technologies), by changing their material incentives (e.g., via a change of control, enforcement and sanctioning practices), or by shaping their codes of conduct and bonds to social norms (e.g., via persuasion and education). A complete physical enforcement of rules is hardly possible as the measures needed to eliminate all physical opportunities to break rules are too costly and/or legally disproportionate. The way out seems to be to search for complete contingent contracts which “get the (economic) incentives right” (cf. e.g., Stiglitz, 1987); with incentives hinging on parameters such as the costs of compliance, the detection probabilities and the sanction levels. In contrast to a prevalent association with criminal law, the sanction in this context denote all economic disadvantages that rule-breakers expect in case of detection. This includes penal sanctions and fines, but it also incorporates damage compensations, recall cost for substandard goods, disposal costs, loss of sales and future options of choice due to a deterioration of reputation, haggling costs for solving disputes (cf. Williamson, 1988) etc. Such *incentive-compatible contracts*<sup>9</sup> would account for the existence of rule-breaking opportunities but eliminate all economic temptations to use them. That is, the “right economic incentives” would supersede any need for bonds to social norms.

Despite efforts to reduce both the opportunities and temptations for opportunism, most economic relationships are characterized by incomplete contracts; i.e. the prescribed behavior is neither completely enforceable nor are the action situations fully incentive-compatible. Without norm-based voluntary compliance, misdirected incentives, which cannot be reduced to zero at reasonable costs, thus continue to induce rule-breaking. Efficient prevention of economic misconduct thence requires *smart and responsive regulatory approaches* (Black, 1997; Braithwaite, 2003; Gunningham *et al.*, 1999). Smart regulation is a regulatory strategy which aims to “get the subjective expected utilities right” by consistently combining measures that reduce misdirected incentives with measures that strengthen the actors’ bonds to social norms. The conception of economic man underlying the change from the famous “*get*

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<sup>9</sup> We use the term “incentive-compatible” to denote a *situation* where the regulatee’s material incentives are right. This does not imply that the regulator is constrained to use voluntary agreements/contracts. Public authorities, e.g., may also resort to unilateral directives, monitoring and sanctioning to achieve incentive compatibility.

*the incentives right*” to the more adequate “*get the subjective expected utilities right*” is the key to understanding what behavioral economic analysis and the regulatory issue are essentially about.

### **3 Disciplinary contributions to the analysis of economic misconduct**

Following the seminal work by Becker (1968, 1982), who has provided an explanation for rule-breaking behavior in terms of economic theory (i.e. by using neoclassical micro-economics to explain areas of behavior usually held beyond the scope of economics), a wide range of economic literature on deviance has evolved. The microeconomic state of the art regarding problems linked to information imperfections, conflicting interests and opportunism is characterized by a wealth of game-theoretic literature on moral hazard and incentive problems which are also known as principal agent (PA) problems. A general introduction and overview of PA literature can be found, e.g., in Grossmann and Hart (1983), Kreps (1990), Mirlees (1999), or Rasmusen (1994). Moral hazard problems have been studied for a long time and in a wide variety of contexts. This includes transactions involving products with credence qualities (e.g., Akerlof, 1970; Stiglitz, 1987).

Drawing on formal *game theory*, PA models represent relational risks as games with uncertain and asymmetric information (cf., e.g., Kreps, 1990). One assumes that one player (principal) knows the behavioral characteristics (i.e. the set of choices, the utility function etc.) of the other player (agent) who performs a task on his behalf (game of complete information). The principal is not able to observe the agent’s efforts and actions directly. At the same time, he is considered to be the decisive player in that he is the one who offers a contract to the agent and who takes account of the agent’s expected response strategy when designing the contract. The principal is assumed to design the contract upon the rationale that, given opportunities for rule-breaking (or low efforts), the agent will not comply (or exert low efforts) if he can thereby profit (individual rationality). “This situation may be viewed as a noncooperative game in which a strategy for the principal consists of a choice of a fee schedule [i.e. a contract with controls and enforceable clauses] granting specified payments for specified outcomes (Weiss, 1995: 72).” Formal PA models are used to study how to design incentive-compatible contracts that induce the desired behavior on the part of the agent. Such contracts represent equilibria in that neither player would be better off by choosing an alternative strategy.

From an *institutional economics* point of view, the question is asked as to how successfully institutional arrangements solve the moral hazard problem (cf. Ménard and Klein, 2004). Economic incentives in an action situation are the joint result of institutional arrangements on several levels: the generic institutional environment, the governance structures including private institutions, and the specific contracts. The institutional environment represents the

basic rules of the game (North, 1990), i.e., the systems of law and property rights and the informal norms in communities. The distinction of different governance structures is linked to *transaction cost economics* which conceptualizes the market as an external mode of organizing economic relationships (with higher powered incentives and lesser controls), and the hierarchy of the firm as an internal mode (with lower powered incentives and greater controls). Hybrid forms are understood to be the in-betweens. Linking the attributes asset specificity and uncertainty to the costs of transactions, transaction cost economics provides an economic explanation as to why certain transactions which differ in their attributes are assigned to certain organizational modes which differ in their competencies and costs (Williamson, 1996)<sup>10</sup>. Private institutions represent voluntary collective agreements which aim to facilitate transactions between autonomous parties by regulating horizontal and vertical cooperation. They are the outcome of the free choice of actors which balance the advantages/costs of various private institutions with those of alternative modes of governance (Brousseau and Raynaud, 2006). The specific contracts which are finally designed by interacting parties in their given institutional framework are likely to be incomplete and to leave some scope for opportunistic behavior since the writing of complete contracts would be prohibitively costly. In the food context, the question of institutional performance with regard to the reduction of moral hazard and the provision of safe products has been related to the choices made on the above-described institutional levels and especially the choice of adequate governance structures along various chains (cf., e.g., Hobbs, 2003; Ménard and Valceschini, 2005; Martino, 2007).

Besides the consideration of material payoffs, there is a growing body of work by economists on pro-social behavior (for an overview see Meier, 2007) as well as on incomplete contracts and trust in economic relationships and social networks (*theory of trust*; cf., e.g. Coleman, 1988; Granovetter, 1985; Stephenson, 2006). This work considers rule-breaking as a relevant behavioral option for economic actors. At the same time, it views people's choices as being motivated by material and non-material motivations (cf., e.g., Arrow, 2000; Frey, 1990; Pistrup-Andersen, 2005). Although this general conception is unchallenged and although many empirical and experimental studies show that a significant number of people possess non-material motivations such as altruistic preferences and notions of fairness and reciprocity (cf., e.g., Camer-

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<sup>10</sup> It is also noted that incentives are influenced by "private ordering" (pledges and guarantees used by deceived partners for ex post sanctioning after the disclosure of opportunism) and "legal ordering" (legal penalties for the offender (Williamson, 1985). More specifically, one could distinguish formal sanctions based on administrative law (fines and obligations such as disposal), criminal law (legal penalties, license removal etc.), civil code/tort law (damage compensations) and contract law (contractual fines, contract terminations) from informal sanctions representing the opportunity costs caused by the negative reactions of market partners (e.g., reputational losses from reduced sales, refusal of business partners to continue business).

er, 2003; Chen, 2000; Fehr *et al.*, 2001), the conclusions to be drawn regarding empirical research on economic behavior are not unanimous.

For analytical convenience, many economic analysts abstract from non-material motivations. Others stress that incomplete contracts that leave some scope for self-interested decision may be superior if people are guilt-averse and if fairness and reciprocity constitute a part of their utility function. Trying to explain experimental and field evidence that contradicts axiomatic game theoretic predictions, some researchers include non-material motivations such as fairness and inequity aversion into formal utility models (cf. e.g., Bolton and Ockenfels, 2000; Fehr and Gächter, 1998; Fehr and Schmidt, 1999). Others stress that they should at least be considered in a comprehensive analysis which does not only consider material payoffs, but also non-material psychological costs (disutilities) and benefits (utilities) associated with economic action (cf. Frey and Stutzer, 2007; Ostrom, 2005). Regarding the preference function, attention is directed towards links between material and non-material motivations and evidence is provided that more complete contracts may evoke defiance, thus crowding out positive intrinsic motivation (see Frey and Jegen, 2001 for an overview of *crowding out theory*, but also: Fehr and Rockenbach, 2003; Ostrom and Walker, 2003).

Using a *management science* perspective with its focus on the performance of applied management practices, Nooteboom (1996) operationalizes empirical research on contract designs and identifies three relational risk sources: the opportunities for opportunism, the incentives (economic temptations) in force, and the level of benevolence seen as limitations to the propensity to yield to economic temptations. These three sources indicate the three basic strategies for mitigating relational risks: (i) opportunity control, (ii) incentive control, and (iii) propensity control. Nooteboom and Berger (1997) stress the mixed empirical evidence for the superiority of different behavioral risk management strategies. Klein Woolthuis *et al.* (2005) confirm in a longitudinal study that the relative importance of these three relational risk sources and of the strategy mixtures used to limit them depends on the situational context.

In the *criminological sciences* two conceptions of deviant man can be distinguished. The first one can be described by the research question being asked as to why people break rules. Consequently research is focused on criminogenic factors that make deviant (groups of) individuals different from non-deviant ones. Examples are crimes being explained as a result of personal defects (cf. Lombroso, 1878), deficiencies/disorders (e.g., Smith and Thornberry, 1995), life-course learning (e.g., Conger and Simons, 1997), strain relief (e.g., Agnew, 1999), or identity construction (e.g., Kaplan, 1995). The second one asks the question as to why people obey rules (cf. Tyler, 1990). Consequently research is focused on protective factors that support the rules and can be seen as the immaterial behavioral determinants that shield actors from deviant acts despite multiple chances of obtaining profit from them (cf. Coleman, 1988).

Protective factors may take intrinsic forms (internalized values) or extrinsic forms (anticipated social disapproval). They may result from shared values in a society (macro level) or a particular social group such as a firm with a law-abiding organizational culture (meso level). In the last two decades, this has been increasingly understood and termed as “social capital” (cf. e.g., Arrow, 2000; Coleman, 1988; Putnam, 1995). They may also arise from empathy and identification resulting from tested personalized relationships and the value of such relationships itself (micro-level). The underlying rational choice accounts in conjunction with *control theories* (cf. Hirschi, 1969; Tittle, 1995, 2000) understand deviance as a social fact, the emergence of which is due to the “natural inclination” of man towards self-interested behavior and the (inevitability of) gaps within the system of formal and informal social control (Gottfredson and Hirschi, 1990).

It is important to stress that the explanatory power of different conceptions of deviant man depends on the situational context. Youth gang violence, e.g., is different from a breach of industrial safety standards aimed at saving costs. Different normative schools – without always stating the context they have in mind or even claiming panhuman validity – attribute different levels of importance to material and immaterial motivations. In the words of Murphy (2004: 2) one can state that there is a division “between those who think that individuals and firms will comply with rules and regulations only when confronted with harsh sanctions and penalties, and those who believe that gentle persuasion and cooperation works in securing compliance with the law”. In addition to the physical incapacitation model of regulation, this antithetic pairing has been labeled the deterrence vs. the accommodative (or: compliance) model of regulation (cf. Picciotto and Campbell, 2002)<sup>11</sup>. Evidence from fields such as occupational safety (Scholz and Gray, 1990), nursing homes (e.g., Braithwaite, 2002), nuclear safety (e.g., Rees, 1994), medical professions (e.g., Davies, 2002) indicates that successful strategies avoid the dysfunctional effects of pure deterrence (Brehm and Brehm, 1981) and the negative effects of lenient accommodation by generating value correspondence (Tyler, 1990), thus simultaneously reducing economic temptations and strengthening social bonds.

#### **4 The analytical framework**

The above-described approaches to the study of behavioral risk share the view that deviance is the result of multi-goal and (potentially) opportunistic decision-making of bounded rational individuals. The analytical framework de-

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<sup>11</sup> If one adds physical target hardening to physical incapacitation (which both reduce the criminal opportunities) and if one associates deterrence not only with criminal sanctions but with all incentive measures that reduce the relative competitiveness of rule-breaking, the three basic regulatory models from criminology (incapacitation/target hardening, deterrence, accommodation) can be related to the three basic behavioral risk management strategies from management science (opportunity control, incentive control, propensity control).

scribed hereafter is aimed at integrating these approaches. We expect it to be useful for the regulatory sciences in general because it represents a tool that can be used as a starting point for regulatory analyses irrespective of the type of offence, the regulator-regulatee relationship, and the regulatory regime under consideration. The analytical framework essentially understands the actors' subjective expected utilities as their motivational drivers. It specifies, in a very general manner, which factors are potentially of interest in a behavioral economic analysis aimed at understanding the mental models and facts as subjectively perceived by the economic actors.

**Table 1: An analytical framework for behavioral determinants**

	$u^o$ : Expected utility for obeying	$u^d$ : Expected utility for disobeying	$\Delta u = u^o -$ Balance
<b>Utilities resulting from material motivations</b>			
$c$ : Costs (various sources)	-200	-10	-190
$p$ : Sales	+1,000	+1,000	0
$l$ : Sanctions	-	-110	+110
$k$ : Non-monetary effort	-100	-100	0
<b><math>a</math>: Total utility from material preferences</b>	<b>+700</b>	<b>+ 780</b>	<b>-80</b>
<b>Utilities resulting from immaterial motivations</b>			
$i^+$ : Intrinsic psychological rewards (e.g. self-esteem)	protective factors +10	criminogenic factors 0	+30
$e^+$ : Extrinsic social rewards (e.g. social respect)			
$i^-$ : Intrinsic psychological costs (e.g., guilt)	crimino-genic factors 0	protective factors -60	+60
$e^-$ : Extrinsic social costs (e.g. social exclusion)			
<b><math>b</math>: Total utility from immaterial preferences</b>	<b>+10</b>	<b>-60</b>	<b>+70</b>
<b>Total utility</b>	<b>+710</b>	<b>+720</b>	<b>-10</b>

The proposed framework is basically an elaboration of the Ostrom concept (2005) which adds so-called “delta parameters” to the material payoffs of an individual to account for the perceived immaterial costs and benefits of breaking and obeying rules. Table 1 illustrates the framework’s rationale. Interpreting the table, two important aspects should be noted:

- The figures are only meant to illustrate the general conception of (deviant) economic behavior that underlies the framework. They neither refer to an empirical setting nor suggest that one should always try to measure immaterial benefits and costs in monetary units.

- The utilities in the different categories, which are used to characterize the different sources and types of motivational drivers, are a function of how facts are perceived by risk-averse and bounded rational actors. For a risk-averse actor, the exemplary temptation (here: 80) for non-compliance thus represents the certainty equivalent which the actor attributes to non-compliance (as opposed to zero for compliance).

Let us now comment on Table 1: the illustrative actor can save  $\Delta u_c = -190$  in costs by disobeying some rule. Since sales are identical in both cases and since the expectation value of the sanction is only  $u_t^d = -110$ , his expected net material loss caused by obeying amounts to  $\Delta u_a = -80$ ; i.e. he is facing a temptation of 80 to break the rule. If the actor had the exclusive objective of maximizing his material benefits, the perceived situational incentives of the contract would not be “right”<sup>12</sup>. In the depicted example, however, the actor is assumed to be of a mixed type: he is assumed to derive a total of  $u_b^o = 10$  worth of immaterial utilities for obeying the rules. He is also assumed to experience a total of  $u_b^d = -60$  worth of immaterial disutilities for disobeying. Given the resulting net immaterial utility  $\Delta u_b = 70$  for obeying the rule, he is not sufficiently protected against the temptation to break it; i.e., his total utility balance of  $\Delta u_a + \Delta u_b = -10$  is in favor of rule-breaking.

Relating the framework to the criminological discourse, one could say that immaterial rewards for obeying rules and immaterial costs for disobeying represent the utility-relevant consequences of protective factors. Accordingly, immaterial costs for obeying rules and immaterial rewards for disobeying can be seen as representing the consequences of criminogenic factors. An alternative understanding would be to attach the terms “protective” as opposed to “criminogenic” to a positive as opposed to a negative *balance* of the immaterial utilities.

Whereas the degree of resistance to a given material temptation results in principle from the balance between protective and criminogenic factors, the illustrative figures in Table 1 are chosen to reflect the characteristics of economic deviance and the rationale of control theory (cf. Hirschi, 1969; Tittle, 1995). Since deviant economic acts are mostly located in otherwise legitimate bona fide organizations and carried out by respected members of the professions and the business community, immaterial gains from disobeying are assumed to be zero. This means that effects such as reactance and defiance are

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<sup>12</sup> While we do not refer to a negligent actor in Table 1, the inclusion of work effort facilitates the consideration of actors who are inclined towards negligence. They would have a negative utility balance  $\Delta u_k$  and exert diligence only if the costs of not doing so exceeded this balance.

not considered and that – contrary to offences such as street gang violence – economic deviance is conceived as being caused by economic temptations that coincide with lacking protective factors rather than by criminogenic factors.

It must be stressed that the scope of the analytical framework is limited: it provides only a rough categorization of behavioral drivers. It does not detail the context-dependent subcomponents which determine the utility outcome within each category. Referring to food production and abstracting from work effort for the time being, we thence substantiate in Table 2a tangible factors that determine – within the material categories of costs (*c*), sales (*p*), and sanctions (*l*) – the utility balance between compliance and non-compliance.

**Table 2a: Behavioral drivers resulting from material preferences in food production**

<i>Factors determining the primary material benefits from non-compliance</i>		
$\Delta u_c$	<ul style="list-style-type: none"> <li>- Cost savings from irregular food production processes such as violations of hygienic standards or breaches of waiting periods (e.g., after application of pesticides or animal drugs)</li> </ul>	
$\Delta u_p$	<ul style="list-style-type: none"> <li>- Sales increases through mislabeling of products regarding their content (e.g., deer vs. kangaroo meat), their weight or their process quality (e.g., organic vs. conventional production)</li> </ul>	
<i>Factors determining the expected material sanction</i>		
<i>Public and non-public sanctions in case of detection</i>		
$\Delta u_l$	<ul style="list-style-type: none"> <li>- Direct sanctions payments (e.g., penal/administrative fines, compensation payments, contractual fines)</li> <li>- Subsequent commitments (e.g., recall costs for sub-standard goods, transportation and disposal costs)</li> <li>- Opportunity costs (e.g., subsidy losses, short-and long-term market losses caused by a deterioration of reputation and exclusion from networks)</li> </ul>	
	<i>Public and non-public sanctioning probabilities</i>	
	<ul style="list-style-type: none"> <li>- Probabilistic action-outcome linkages, i.e. conditional probabilities (given compliance or non-compliance) of adverse outcomes</li> <li>- Product-orientated control intensities and connected tracing and detection probabilities</li> <li>- Detection probabilities from direct activity monitoring and on-site controls in food business operations such as farms, slaughterhouses, retailers</li> <li>- Detection probabilities from controls of mandatory record keepings such as drug delivery records, transport documents, selling and buying documents</li> <li>- Other detection probabilities (e.g., whistle-blowing by employees, neighbors etc.)</li> </ul>	

Material advantages from rule-breaking may result from various kinds of cost savings generated by sub-standard practices regarding environmental, hygienic, occupational safety or animal health prescriptions. Advantages may

also be generated by fraudulent labeling. The expected sanction, in turn, depends on two parameters: the sanction level which an offending actor expects in the case of disclosure, and the expected sanctioning probabilities. The sanction level represents a mixture of economic losses in the case of disclosure such as direct sanction payments (administrative and penal fines, compensation payments, contractual fines), subsequent expenses (e.g., recall and disposal costs), and opportunity costs (e.g., short- and long-term market losses, loss of subsidies<sup>13</sup> etc.).

The probability of an offence being detected and sanctioned is determined by various factors: to start with, it depends on the conditional probabilities linking actions to outcomes (with higher probabilities for adverse outcomes contingent on non-compliance). It furthermore depends on the intensity of monitoring efforts by food surveillance officers as well as the effectiveness of whistle-blower systems and downstream controls by buyers. With regard to downstream product controls it should be noted that both incomplete inspection and incomplete tracing increase the relative profitability of rule-breaking since they reduce the expectation value of sanctions.

**Table 2b: Behavioral drivers resulting from immaterial preferences in food production**

<b>Behavioral determinants related to immaterial preferences (protective factors)</b>	
<i>(Social-) psychological opportunity costs from non-compliance</i>	
$\Delta u_{i^+}$	<ul style="list-style-type: none"> <li>- Intrinsic psychological “opportunity costs”, i.e. loss of intrinsic rewards (e.g. loss of self-esteem of being a “good farmer”, or of not belonging to “those who cheat”)</li> </ul>
$\Delta u_{e^+}$	<ul style="list-style-type: none"> <li>- Extrinsic psychological “opportunity costs”, i.e. loss of extrinsic rewards (e.g. loss of the usual respect by “relevant others” such as the farming or the village community)</li> <li>- Probability that the offence becomes known by “relevant others” (social disclosure)</li> </ul>
<i>(Social-) psychological costs from non-compliance</i>	
$\Delta u_{i^-}$	<ul style="list-style-type: none"> <li>- Direct intrinsic psychological costs (e.g., feelings of guilt and subsequent adverse consequences such as insomnia etc.)</li> </ul>
$\Delta u_{e^-}$	<ul style="list-style-type: none"> <li>- Direct extrinsic psychological costs (e.g., explicit ostracism and social exclusion delivered by relevant members of the social communities the food business operator is affiliated to)</li> <li>- Probability that the offence becomes known by “relevant others” (social disclosure)</li> </ul>

<sup>13</sup> The EU cross compliance regulations in accordance with which farmers, in order to receive full transfer payments, must comply with standards related to soil, habitat, landscape and environmental protection, public, animal and plant health, and animal welfare, can be seen as an attempt to increase the opportunity costs of rule-breaking.

In Table 2b we specify the factors that determine – within the immaterial categories of intrinsic and extrinsic psychological rewards and costs – the utility balance between compliance and non-compliance.

The immaterial determinants can be divided into the expected opportunity cost of rule-breaking (i.e. the foregone (social-) psychological rewards in the case of rule-breaking), and the direct (social-) psychological costs such as feelings of guilt and social exclusion. They can also be divided, in accordance with their internal or external sources, into intrinsic factors (resulting from internalized values) and extrinsic ones (resulting from the probability of social disclosure and the expected reactions of “relevant others”).

Even after detailing context-specific subcomponents several problems persist. A serious measurement problem will arise if one tries to quantitatively assess the utilities and disutilities associated with economic incentives on the one hand, and the psychological and social costs and rewards on the other. Empirical analysts estimate and quantitatively assess the actors’ material incentive situation using formal models (cf. e.g. Starbird, 2005). Hirschauer and Mußhoff (2007) have used a moral hazard model in a quantitative study of economic incentives in the poultry chain. This model considers all factors that determine the economic temptations for rule-breaking that firms are exposed to in their environments: (i) the cost savings and/or sales increases of rule-breaking, (ii) the conditional probabilities of adverse outcomes, (iii) the detection probabilities from various sources (including downstream product controls and tracing, public food inspection activities including on-site visits, and whistle-blowing), (iv) the sanctions (including administrative fines, compensation payments and other commitments such as recall and disposal, and opportunity costs caused by losses of sales from reputational sanctions).

The above-mentioned study has shown that it is difficult, but manageable to reconstruct the utilities as perceived by bounded rational and risk-averse decision-makers. As mentioned above, however, social analysts will regularly encounter an incommensurability problem when trying to quantify the individual’s immaterial utility components or map immaterial gains and losses into monetary units. Hence, qualitative methods of social analysis may be more adequate in obtaining information regarding the social-psychological consequences associated with individual choices including deviance. Furthermore, although the framework understands the subjective expected utilities as behavioral drivers, it is designed as a general tool. Hence, it does not specify context-dependent theoretical propositions regarding the antecedents of the individual’s expectations. That is, it neither describes how these expectations are formed by bounded rational and risk-averse individuals in stochastic environments nor discloses the underlying (biographical and social) cause-and-effect relationships such as an individual’s social learning and conditioning.

In brief, the analytical framework can be seen as an integrative “language” that facilitates communication between social analysts who, while using dif-

fering foci, methods and perspectives, concern themselves with human misconduct on the basis of methodological individualism. Based on the conception of the framework, the diverse theories of economic misconduct can be understood as variations of the same theme which differ regarding the following dimensions: (i) the number and types of behavioral determinants they focus on in the analysis, (ii) their emphasis on positive explanations as opposed to normative conclusions regarding regulatory strategies; (iii) their focus on a variation in behavioral determinants between individuals as opposed to a variation between groups and contexts; (iv) their perspective in terms of horizontal (static) approaches that assess behavioral outcomes of certain populations at certain points in time, as opposed to vertical (dynamic) approaches that explicitly move up the cause-and-effect chain and search for the social and biographical origins and causes that precede the observed phenomena.

## **5 Conclusion: the framework's contribution to an analysis of institutional performance**

Institutional performance analysis is commonly associated both with transaction cost economics and agency theory. Economizing on transaction costs (including agency costs and the ex post costs of processing disputes) with an adequate choice of governance structure is seen, on the one hand, as the reason why transaction-cost efficient governance structures evolve and survive in a natural selection process. On the other hand, allowing for the temporal existence of inefficient solutions, economizing on these costs is understood as the organizational imperative for a judicious choice of governance structures (cf. Williamson, 1988).

Many institutional analyses which conceptually rely on transaction cost and agency theory link observed institutional phenomena such as governance structures and contract designs, on the one hand, with the degree of asset specificity and uncertainty, on the other. By contrast, the analytical framework proposed in this paper focuses on the action situations of agents engaged in certain transactions: using the framework means attempting to reconstruct the regulatee's action situation in accordance with his subjective perception. This includes *all* the payoffs expected by the regulatee (those that directly result from the contract as well as the share of the ex post dispute settlement cost which he expects to have to bear in the case of disclosure). A behavioral economic analysis based on the framework means opening up the black box of the regulatees' action situation by incorporating the subjectively perceived material incentives in addition to reputation effects, social norms and community pressure into the analysis. With regard to agro-food chains, such a *behavioral* economic analysis would improve our understanding of the interactions between various stakeholders. Using the framework for institutional performance analysis implies that situations where existing opportunities and temptations to break rules are not neutralized by protective factors are understood as being

the consequence of a less-than-optimal institutional arrangement regarding the solution of the moral hazard problem, i.e., the internalization of external costs.

In a normative sense, the identification of less-than-optimal institutional solutions calls for a judicious search for better “opportunity control”, “incentive control” and “propensity control” arrangements. From a regulatory point of view, the choices that have to be made in this regard represent ill-structured and complex decision problems which cannot be supported by formal optimization procedures. The complexity associated with these choices arises from the fact that, besides the design of a specific contract, institutional arrangements on several levels (i.e. the governance structures as well as the generic institutional environment) impact simultaneously on the regulatee’s behavioral determinants and the strategies available to the regulator.

Finally, it should be noted that the methodological contribution of the framework is limited: first of all, it is no instrument to identify situations where people are willing, but unable to comply with rules. This is an important, but separate aspect that needs to be dealt within a capacity building framework. Furthermore, the framework is neither able to predict institutional changes which are likely to occur in the future nor is it able to indicate the optimal changes in the institutional arrangements on different levels that should occur in the interest of food safety. However, it does support a primary step in knowledge generation, i.e. the identification of behavioral risks and institutional “hot spots” with below-adequate performance regarding the mitigation of these risks. In other words: The framework’s main contribution for future analyses in the food safety domain is that it shows *what* needs to be studied in a behavioral economic analysis. Appreciating the framework’s crucial methodological contribution, whilst admitting to its limitations, provides a point of departure for future empirical studies that are better able to inform us how successful food safety institutions are in steering the behavior of food business operators.

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