Game Theory and the Law:
The "Legal-Rules-Acceptability Theorem"
(A rationale for non-compliance with legal rules)

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Abstract

Since its creation, legal science has lacked of a formal and rational explanation for the non-compliance with legal rules carried out by citizens, and only intuitive explanations exist arguing that it would be a psychological issue or that it derives from an uncontrollable desire of citizens to maximize their individual utility functions.

Under the "Legal-Rules-Acceptability Theorem", which assumes bounded rationality of both citizens and policymaker players, a legal rule is deemed to be: (i) "reasonable", if the subset of permitted strategies under such legal rule enacted by policymaker players contains only and all strategies by means of which both the maximization of the individual utility function of the citizen and the maximization of the social utility function to some extent are possible, and (ii) "theoretically stable", if the equilibrium point representing a situation of "generalized compliance" with such legal rule is a Nash Equilibrium.

However, we note that policymaker players cannot guarantee the "generalized compliance" with a legal rule even when they are sure that it is "reasonable" and "theoretically stable", since citizens cannot perceive the lasting mediate harm from their non-compliance but only the momentary immediate benefit from it due to their limited computation capacity and bounded rationality. Therefore, legal rules are only deemed to be "stable" if citizens become able to perceive what we call a "recognizable harm" derived from the "generalized non-compliance" with the legal rule.

Therefore, by means of the "Legal-Rules-Acceptability Theorem", we propose: (i) a game-theoretic description of how citizens take the decision to comply or not with a specific legal rule, which is related to the perception they have regarding the "reasonability" and "stability" of such rule, and (ii) a bounded rationality answer to the question of why citizens do not comply with a specific legal rule even if its "generalized compliance" is useful and its "generalized non-compliance" is harmful for every one.

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I. INTRODUCTION

It is commonly assumed that players taking decisions that involve moral value judgments make use of its "universalistic" preferences (i.e., those under which the social utility function is taken into account when deciding, as opposed to the use of "particularistic" preferences which are those under which the social utility function is not taken into account when deciding) under one of the following two utilitarianism approaches:

(i)   Rule utilitarianism, which involves choosing: (a) first, a "morally right code" that maximizes the social utility function in any similar games, and (b) then, a "morally right action" which agrees with the chosen "morally right code".

Each "morally right code" contains rights and obligations that cannot be neglected, even in case that the social utility function can be maximized by departing from those rights and obligations.

Since it is required to choose a "morally right code" before choosing a "morally right action", the "right morality" of the "morally right action" is subject to the maximization of the social utility function and the respect for the rights and obligations contained in the chosen "morally right code".

Therefore, rule utilitarianism means that maximization of the social utility function through a "morally right action" must be carried out respecting the rights and obligations contained in the "morally right code".

(ii)   Act utilitarianism, which involves choosing an action that is deemed to be "morally right" only if maximizes the social utility function in a specific game.

Since it is not required to choose a "morally right code" before choosing a "morally right action", the "right morality" of the "morally right action" is only subject to the maximization of the social utility function and not subject to the respect of rights and/or obligations.

Therefore, act utilitarianism means that maximization of the social utility function through a "morally right action" can be carried out without considering the existence of any rights and obligations.

However, in our view, there would be a third perspective of utilitarianism which we call "particularistic act utilitarianism" used by players using "particularistic" preferences (i.e., not taking the social utility function into account when deciding) when making a decision that involves moral value judgments, due to the fact that: (i) they are only able to perceive the momentary and immediate benefit from their breach of the "socially accepted moral code", and (ii) they are not able to perceive the greatest mediate and lasting harm of its "generalized non-compliance".

In this regard, "particularistic act utilitarianism" involves choosing an action that maximizes the individual utility function of the player who chooses (and eventually the individual utility functions of players related to him) without taking into account: (i) whether the social utility function is maximized or minimized, and (ii) the existence of any rights or obligations.

Therefore, an action taken under "particularistic act utilitarianism" cannot be regarded as a "morally right action" since it is not based on "universalistic" preferences nor seeking the maximization of the social utility function.

II.   REFLECTIONS ON UTILITARIANISM IN SOCIETY

Obviously, if policymaker players model a society under "particularistic act utilitarianism", such a society would face the lack of any duty or obligation and live in a total anarchy state.

In this regard, we are confident that players of such a society would make a reflection like that of Rudolf Von Ihering:

> "(...) suppose that there is no State or a revolution reduces the public power to impotence and then you would understand what the State and the Law are for individuals (...). Then in a year, sometimes a month, citizens learn about the importance of those, more than what has been revealed to them during all their previous existences. The State and the Law previously insulted, are invoked in a day of trouble, and this man who laughed at us when we shouted: - In the Law, is yourself who you protect and secure, defend it, since it is the purpose of your being – suddenly that man understands us."

On the other hand, if policymaker players model a society under act utilitarianism, rights such as life, property and freedom of expression could be neglected in a specific game since an action only needs to maximize the social utility function to be deemed "morally right", which will generate lack of legal certainty.

Finally, if policymaker players model a society under rule utilitarianism, such rights could not be neglected even in cases where the social utility function could be maximized in a specific game by doing so, since the action must respect the "morally correct code" to be deemed "morally right".

In that sense, it is our impression that a society under rule utilitarianism would provide greater legal certainty than a society under act utilitarianism, due to the fact that:

(i)   The rule utilitarian society will count with a legal regime comprised of legal rules with a set of immutable predefined exceptions (similar to a perfect system of statutory law).

(ii)   The act utilitarian society will count with a legal regime comprised of legal concepts without a set of immutable predefined exceptions (similar to a perfect system of common law) in which: (a) in the worst case, the protection of the legal concept is decided according to each specific case without using predefined parameters, and (b) in the best case, the protection of the legal concept evolves according to parameters which have been predefined in solutions to previous specific cases.

However, it must be noted that even if society is modeled as a society under rule utilitarianism, there will be players taking their decisions as to comply or not with a "morally acceptable social code" or a legal rule under particularistic act utilitarianism.

III. MODEL OF THE UTILITY OF LEGAL RULES IN A SOCIETY UNDER RULE UTILITARIANISM

The model attempts to represent the case in which policymaker players have decided to model a society under rule utilitarianism, which comprises a first cooperative game and a second non-cooperative game.

(i)   In the cooperative game:

(a)   The players jointly choose a moral code known as m from the set of all possible moral codes known as M in order to maximize the social utility function called W, which is defined as follows:

$$m \in \mathrm{M}$$

Obviously, in real life, players do not have the ability to jointly choose a moral code. The choice of the moral code m pretends to represent the fact that policymaker players have chosen to model the society as a rule utilitarian society instead of an act utilitarian society.

Therefore, policymaker players have established rights and obligations (represented by the chosen moral code m) that cannot be neglected even if this could generate the maximization of the social utility function.

(b)   The chosen moral code m comprises a set of legal rules known as R, which is defined as follows:

$$R \in m$$

This statement pretends to represent the fact that the moral code m chosen by the policymaker players contains a set of legal rules which are representations of the rights and obligations contained in such code.

In this regard, the set of legal rules R includes groupings of legal rules (e.g., the Bill of Rights, codes, unified legal texts, laws, regulations) that express the manner in which such rights or obligations must be understood.

(c)   Then, the players jointly choose a specific legal rule known as r from the set of legal rules R under the moral code m, which is defined as follows:

$$r \in R$$

This statement pretends to represent that policymaker players have created specific legal rules within such groupings of legal rules.

In this regard, we believe that every legal rule represents or should represent the maximization of the social utility function W with respect to a specific case.

Obviously, in real life, players do not have the ability to jointly choose a moral code and/or a legal rule since they must assume the social role of being citizens and comply with all legal rules contained in the set of legal rules within the established moral code.

In this regard, the cooperative game is only a fiction that pretends to represent the existence of a "social contract" by means of which all players are subject to the chosen moral code and to every legal rule contained in the set of legal rules within the moral code established by policymaker players.

(ii)   In the non-cooperative game $\Gamma(r)$:

(a)   Each player *i* chooses a strategy s_i within a general set of strategies known as S .

In this regard, it must be noted that there is a subset of permitted strategies under the legal rule r known as $P(r)$ within the general set of strategies S .

Therefore, each player *i* chooses a strategy s_i that belongs to the subset $P(r)$, which is defined as follows:

$$s_i \in P(r)$$

That is, each player chooses a strategy s_i that maximizes his own individual utility function U_i without deviating from the legal rule r .

However, we have previously noted that there would be players who choose their strategy under particularistic act utilitarianism, deviating from the legal rule in case this action would allow them to maximize their own individual utility functions or those of players related to them (i.e., friends and relatives).

Therefore, particularistic act utilitarian players choose any strategy within the general set of strategies S which could be inside or outside $P(r)$, which is defined as follows:

$$s_i \in S$$

That is, each particularistic act utilitarian player chooses a strategy s_i that allows him to obtain the greatest possible utility in every situation, without analyzing whether such a strategy complies with the legal rule or not.

(b)   When choosing a strategy s_i belonging to the subset $P(r)$, each player *i* will choose its strategy s_i using a "prediction function" called

π by which he tries to predict the location of an equilibrium point $\bar{s}$

that maximizes the social utility function to some extent, which is defined as follows:

$$\bar{s} = (s_1,..., s_n)$$

$$\bar{s} = \pi(\Gamma(r))$$

Since rule utilitarian players base their decisions involving value judgments on "universalistic" preferences, they use the "prediction function" π to maximize the social utility function W to some extent and thus grant the same relative weight to all individual utility functions when choosing their strategies s_i.

However, a player i can comply with the legal rule r using many different strategies s_i belonging to the subset $P(r)$ with different levels of compliance.

That is, the "ideal compliance" with legal rule r (i.e., the level of maximization of the social utility function W desired by the policymaker players when enacting the legal rule) can only be achieved by using some but not all of these strategies s_i.

Therefore, players i use the "prediction function" π since they want to comply with the legal rule r maximizing their own individual utility functions U_i as much as possible and maximizing the social utility function W to some extent.

On the other hand, act particularistic utilitarian players would choose their strategies s_i without using the "prediction function" π since they only want to maximize their individual utility functions U_i, regardless of whether their strategies maximize the social utility function W and to what extent.

(c)   The utility function of each player i must be defined as follows:

$$U_i = U_i(\bar{s}, r)$$

Therefore, the utility function of each player i with respect to the legal rule r is defined by the following two variables:

(1) $\bar{s}$ (an equilibrium point that maximizes the social utility function W to some extent), which implies that the other players i are using strategies s_i that: (1.1) are inside the subset of strategies permitted under the legal rule known as $P(r)$ and, (1.2) have been chosen by using the "prediction function" π.

Therefore, the variable $\bar{s}$ represents the situation where the other players *i* comply with the legal rule *r* by using strategies that are within the subset $P(r)$ and attempt to achieve its "ideal compliance" by using the "prediction function" π, thus there is a situation of "generalized compliance".

Thus, the existence of the legal rule *r* is only useful for a player *i* while there is a situation of "generalized compliance" with respect to it, since the utility of the legal rule for him depends on the variable $\bar{s}$.

(2)   *r* (the legal rule *r*), which implies that the utility function of player *i* is maximized by living in a society with a legal rule that maximizes the social utility function W.

In this regard, note that the definition of the individual utility function U_i is the same for every player *i* given that even particularistic act utilitarian players (who are willing to deviate from the legal rule in case this would allow them to maximize their own individual utility functions, which does not mean that they fail to comply with the legal rule in all cases) have their individual utility functions maximized when: (1) there is a legal rule *r* that maximizes the social utility function W of the society we are part of, and (2) there is a "generalized compliance" of the legal rule *r*.

Therefore, the legal rule *r* is: (1) useful for players *i* (whether rule utilitarian or particularistic act utilitarian) when there is a situation of "generalized compliance" of this legal rule, and (ii) useless for players *i* when there is a situation of "generalized non-compliance" of this legal rule.

A first impression would be that players *i* (whether rule utilitarian or particularistic act utilitarian) would have incentives to deviate from the legal rule *r* by using strategies that are not inside $P(r)$ and/or by not using the "prediction function" π when there is a "generalized non-compliance" of such legal rule, since it is useless in such a state.

(d)   Given that the social utility function W is defined by individual utility functions U_i, the definition of W would be:

$$W = W(\bar{s}, r) = W(\pi(\Gamma(r)), r)$$

In this regard, the legal rule *r* is useful for society as a whole if it maximizes the social utility function and there is a "generalized compliance" of such legal rule.

IV. THE LEGAL-RULES-ACCEPTABILITY THEOREM

As mentioned above, policymaker players might model a society under rule utilitarianism, which would imply the choice of a moral code and enacting both groupings of legal rules and legal rules within them.

However, the modeling of the society as a society under rule utilitarianism as ours does not guarantee that players take the decision to comply or not with a legal rule using rule utilitarianism.

In this regard, in real life, people make the decision to comply or not comply with legal rules not under rule utilitarianism nor under act utilitarianism, but under particularistic act utilitarianism.

Therefore, when taking the decision on whether comply or not comply with a legal rule, the strategy of each player (which decides under particularistic act utilitarianism) will be: (i) in the best case, inside the subset of strategies permitted under the legal rule, and (ii) in the worst case, outside the subset of strategies permitted under the legal rule.

However, the model developed in section III shows that the "generalized compliance" of every legal rule is useful even for particularistic act utilitarian players, thus they should, but seem not to worry about, use: (i) a strategy that is inside the subset of strategies permitted under the legal rule, and (ii) the "prediction function".

Therefore, the big question arises: why players do not comply with a legal rule if its "generalized compliance" is useful for every one of them?

To our knowledge, basically there would be two explanations:

(i)   Weak explanation: players tend not to internalize moral codes, but only legal rules:

Each player is bounded rational, thus it is unable to perceive the general obligation (contained in the moral code) contained in each specific legal rule. Therefore, each player decides whether to comply or not comply with a legal rule based on his personal perception as to whether its "generalized non-compliance" is detrimental for him.

For example, buying bootleg DVDs and carrying out acts of plagiarism are two representations of the same general obligation "do not copy" of the moral code, contained in two different legal rules.

In this regard, each player seems to condemn the second and at least tolerate the first, because he perceives that the "generalized non-compliance" of the latter is not detrimental for him.

However, if the player would tend to internalize moral codes, he could understand that the non-compliance of the legal rule indicating "do not buy bootleg DVDs" means: (a) non-complying with the obligation "do not copy" of the established moral code, and (b) promoting the non-compliance of other legal rules representing the general obligation "do not copy" of the established moral code.

However, we believe that this explanation is subsumed within the strong explanation below.

(ii) Strong explanation: players do not perceive the mediate benefits related to the "generalized compliance" of the legal rule or a "recognizable harm" related to its "generalized non-compliance".

Because the players are bounded rational, computing capacity is limited, thus they are able to include immediate benefits or immediate harms in their computation when choosing their strategies, but are unable to include mediate benefits or mediate harms.

For example, players choose to deviate from certain transit legal rule in order to reach their destination more quickly at a specific time.

(a) When most of the players comply with transit legal rules, every player reaches his destination every day at t', with an individual utility function u'.

(b) When most of the players do not comply with transit legal rules, every player reaches his destination some days at t' and some other days at t, with an individual utility function u, being that $t'<t$ and $u'>u$.

Therefore, the mediate benefit of the "generalized compliance" of transit legal rules is to reach destination every day at t' and the mediate harm is to reach destination some days at t' and some other days at t.

However, provided the limited computing capacity of the player, he is unable to include the following into his computation when choosing his strategy:

(a) The mediate benefit, thus he decides not to comply with the legal rule (i.e., to use a strategy that is not inside the subset of strategies permitted under the legal rule) to obtain an immediate benefit from reaching its destination at t' in a specific game.

(b) The mediate harm, thus he decides:

(1) In most games, not to comply with the legal rule (i.e., to use a strategy that is not inside the subset of strategies permitted under the legal rule) to obtain an immediate benefit from reaching its destination at t' in a specific game.

(2) In a minority of games, to comply with the legal rule (i.e., to use a strategy that is inside the subset of strategies permitted under the legal rule) and not to obtain an immediate benefit from reaching its destination at t' in a specific game only in case this could cause him to suffer an immediate harm (e.g., police officers are vigilant on the route).

However, when the player perceives only the immediate but not the mediate harm, it chooses a "satisfactory" strategy that is inside the subset of permitted strategies in order to comply with the legal rule in some way, but does not use the "prediction

function" in order to try to achieve its "ideal compliance" by choosing an "optimal" strategy.

V.   GENERAL DESCRIPTION OF THE THEOREM

It must be pointed out that the model shown in section III assumes that:

(i)   Policymaker players are rational enough to create only "reasonable" legal rules.

(ii)   All legal rules are "reasonable".

However, policymaker players are bounded rational players (i.e., with limited knowledge capacity and limited computing capacity), thus they could have enacted one or more "unreasonable" legal rules.

On the other hand, citizens are players *i* with bounded rationality and limited computing capacity, thus they would not perceive the mediate benefit from the "generalized compliance" of the legal rule or a "recognizable harm" from its "generalized non-compliance".

In this regard, the "Legal-Rules-Acceptability Theorem" is intended to show that acceptance and "generalized compliance" of a specific legal rule by players *i* of a specific game requires that the legal rule complies with the following two lemmas: (i) the "reasonability" of legal rules, and (ii) the "stability" of legal rules.

V.1   First lemma: the "reasonability" of legal rules

The "reasonability" of the legal rule r depends on the following two principles: (i) the strong principle: the subset $P(r)$ of the legal rule contains only "reasonable" strategies, and (ii) the weak principle: the subset $P(r)$ of the legal rule contains all "reasonable" strategies.

V.1.1 Strong principle: the subset $P(r)$ of the legal rule contains only "reasonable" strategies

According to the model in section III, the definitions of the individual utility function of each player *i* and the social utility function with respect to the legal rule r are the following:

$$U_i = U_i(\bar{s}, r)$$

$$W = W(\bar{s}, r)$$

Therefore, the definition of the individual utility function of each player *i* and the definition of the social utility function include the variable $\bar{s}$, which represents an equilibrium point in which players *i* use strategies s_i that: (a) are inside the subset of strategies permitted under the legal rule known as $P(r)$, and (b) have been selected using the "prediction function" π.

In this regard, the variable $\bar{s}$ represents the "generalized compliance" of the legal rule r.

However, regarding the subset $P(r)$ of the legal rule that is part of the definition of the variable $\bar{s}$, the model assumes that it only includes strategies s_i by which it is possible to achieve not only the maximization of the utility function of each individual player U_i, but also the maximization of the social utility function W to some extent if the "prediction function" π is used for choosing them.

Regarding this, the following two scenarios must be analyzed:

(i) The subset $P(r)$ contains only strategies s_i by which it is possible to achieve both the maximization of U_i and the maximization of W to some extent at the same time:

Under this scenario, the use of the "prediction function" π to choose a strategy from the subset $P(r)$ will necessarily imply the maximization of the social utility function W to some extent, as this can be achieved by using any strategy s_i inside the subset $P(r)$.

Therefore, if the subset $P(r)$ contains only strategies s_i by which the maximization of W to some extent can be achieved, the "generalized compliance" of the legal rule r generates a mediate benefit and its "generalized non-compliance" generates a mediate harm in all cases.

It must be noted that this scenario assumes that policymaker players are rational enough to not have included a strategy s_i which only maximizes U_i and does not maximize W inside the subset $P(r)$.

(ii) The subset $P(r)$ contains some strategies $s_i{}'$ (a specific grouping of strategies s_i) by which only the maximization of U_i but not the maximization of W to some extent is possible:

In our view, due to the fact that policymaker players are bounded rational players, there may be a legal rule r for which not all strategies inside its subset $P(r)$ maximize both the individual utility function U_i and the social utility function W.

In this regard, assume the existence of strategies $s_i{}'$ inside the subset $P(r)$, which maximize the individual utility function U_i of player i but do not maximize the social utility function W.

Under this scenario, the use of the "prediction function" π to choose a strategy from the subset $P(r)$ will not necessarily imply the maximization of the social utility function W to some extent, since this is not possible when using strategies $s_i{}'$.

In this regard, given the bounded rationality of players i, the use of the "prediction function" π to choose a strategy from the subset $P(r)$ could lead to choosing a strategy s_i' by which it is not possible to achieve any maximization of the social utility function W.

Under this scenario, the "generalized compliance" of the legal rule r would not maximize the social utility function W in all cases and, therefore, would not generate a mediate benefit for each of the players and its "generalized non-compliance" would not generate a mediate harm in all cases.

Therefore, the legal rule will be deemed to be "reasonable" if and only if the subset $P(r)$ includes only "reasonable" strategies s_i (i.e., strategies s_i by which it is possible to achieve both the maximization of U_i and the maximization of W to some extent at the same time), thus its "generalized compliance" will generate a mediate benefit and its "generalized non-compliance" will generate a mediate harm in all cases.

V.1.2 Weak principle: the subset $P(r)$ of the legal rule contains all "reasonable" strategies

According to the strong principle, subset $P(r)$ of legal rule r must include only "reasonable" strategies s_i, which does not imply that it contains all "reasonable" strategies s_i.

In this regard, the weak principle requires subset $P(r)$ of legal rule r to be "complete"; i.e., it must contain all "reasonable" strategies s_i.

However, due to the policymaker players' bounded rationality, it is possible that there is a legal rule r in respect of which not all strategies s_i that maximize the social utility function W are contained in its subset $P(r)$.

Regarding this, the following two scenarios must be analyzed:

(i)   The subset $P(r)$ contains all strategies s_i by which it is possible to achieve both the maximization of U_i and the maximization of W to some extent:

Under this scenario, subset $P(r)$ contains all strategies s_i by which it is possible to achieve the maximization of W to some extent.

Therefore, there are no strategies s_i outside the subset $P(r)$ by which a player i could be able to comply with legal rule r, maximize its individual utility function U_i and also maximize the social utility function W to some extent.

Therefore, players i will perceive that the subset $P(r)$ of legal rule r is "complete", since it contains all "reasonable" strategies s_i and there are no other "reasonable" strategies s_i outside this subset.

However, this scenario assumes that policymaker players are rational enough to have included all "reasonable" strategies s_i inside subset $P(r)$.

(ii)   The subset $P(r)$ does not contain any strategy s_i* (a specific grouping of strategies s_i) by which it is possible to achieve both the maximization of U_i and the maximization of W to some extent.

Due to the bounded rationality of policymaker players, it is possible that there is a legal rule r in respect of which not all strategies s_i that maximize both the maximization of the individual utility function U_i and the maximization of the social utility function W are inside its subset $P(r)$.

In this regard, let's assume the existence of strategies s_i* outside the subset $P(r)$ by which a player i could be able to comply with legal rule r, maximize its individual utility function U_i and also maximize the social utility function W to some extent.

Under this scenario, at least one player i trying to use a strategy s_i* will perceive that the subset $P(r)$ of the legal rule r is "incomplete", since this subset does not contain all "reasonable" strategies s_i and there are "reasonable" strategies s_i* outside of it.

Therefore, the legal rule will be considered as "reasonable" if and only if the subset $P(r)$ includes all strategies s_i by which it is possible to achieve the maximization of the social utility function W to some extent.

In this regard, when the legal rule r is "reasonable" (i.e., it does comply with the two "reasonability" principles, thus subset $P(r)$ includes only and all strategies s_i by which it is possible to achieve both the maximization of U_i and the maximization of W), policymaker players can be certain that the legal rule r does not grant incentives to be non-complied by players i, thus players i cannot justify their non-compliances arguing that there are strategies s_i* which were not included by policymaker players inside subset $P(r)$, since there are no strategies s_i outside subset $P(r)$ by which it is possible to achieve both the maximization of U_i and the maximization of W at the same time).

As an example, please consider the following case:

Policymaker players have created a legal rule r that establishes the following "regular proceeding" to obtain a certificate from a governmental entity:

> *"In case a user-player wants to obtain a certificate from a governmental entity, it must obtain it under the "regular proceeding", which implies that the certificate will be delivered in the "regular term" t (3 business days) with a utility u_1 (since the certificate will be obtained in t paying the "regular fee")."*

In this regard, it must be taken into account that a lot of user-players need to obtain the certificate from a governmental entity under an "adapted proceeding" which is not regulated, which implies that the certificate will be delivered in the "adapted term" t' (1 business day) with a utility u_1' (since the certificate will be obtained in t', which is lower than t, paying the "regular fee" plus a bribe), provided that $u_1' > u_1$.

Therefore, a user-player that really needs to obtain the certificate immediately will choose the "adapted proceeding" with utility u_1' over the "regular proceeding" with utility u_1.

Likewise, the bureaucrat-player in charge of providing the proceeding must choose between:

(i)   Providing the "regular proceeding" in the "regular term" t, with a utility u_2 for him (coming from carrying out just a common effort and receiving just its salary).

(ii) Providing the "adapted proceeding" in the "adapted term" t', with a utility u_2' for him (coming from carrying out a greater effort, but receiving its salary plus the bribe), being that $u_2' > u_2$.

In this regard, the payments from the strategies of the user-player and the bureaucrat-player are the following:

		Bureaucrat-player	
		Regular	**Adapted**
User-player	**Regular**	*(u_1 ,u_2)*	*(u_1 ,u_2)*
	Adapted	*(u_1 ,u_2)*	*(u_1' ,u_2')*

When a user-player chooses the "adapted proceeding" and the bureaucrat-player chooses the "regular proceeding", the "regular proceeding" will be provided since the bureaucrat-player does not want to provide the "adapted proceeding" and the user-player prefers to obtain the certificate in the "regular term" t with a utility u_1 rather than not obtaining it.

Likewise, when the user-player chooses the "regular proceeding" and the bureaucrat-player" chooses the "adapted proceeding", the "regular proceeding" will be provided since the bureaucrat-player will be obliged to carry out its work and provide the certificate in the "regular term" t with a utility u_2 for him.

As can be seen, for both the user-player and the bureaucrat-player, the "regular proceeding" is weakly dominated by the "adapted proceeding", thus both have incentives to commit an act of corruption.

It is our understanding that the "adapted proceeding" is a "reasonable" strategy s_i^* which should be inside the subset $P(r)$ of legal rule r, since the need of

those user-players that are urged to obtain the certificate in a lower term must be covered by the government and could be covered by establishing a "double-window" system.

In this regard, if policymaker players include the "adapted proceeding" as a strategy s_i inside the subset $P(r)$ of legal rule r, a "double-window" will be established as follows:

(i)   The "adapted proceeding" that currently configures an act of corruption will become a formal and legal proceeding under which the certificate will be delivered in an "adapted term" t' with utility u_1' for the user-player and utility u_2' for the bureaucrat-player.

Regarding this, the utility will be u_2' for the bureaucrat-player[1] since the government will: (a) charge the user-player with an "adapted fee", corresponding to the sum of the "regular fee" plus an extra payment that represents the average price of paid bribes, and (b) pay a greater salary to those bureaucrat-players that provide "adapted proceedings" in the window of "adapted proceedings".

(ii)   The certificate could be provided by the "regular proceeding" or the "adapted proceeding", at the user-players discretion.

(iii)   The bureaucratic system will seem more efficient to all user-players, since it provides all needed proceedings.

(iv)   The corruption levels will be reduced, since the bureaucrat-player will have no incentives to commit an act of corruption due to the fact that he can obtain the same utility u_2' that he obtained when carrying out an act of corruption by means of the provision of the "adapted proceeding" which is now formal and legal.

(v)   The legal rule r will be considered "reasonable" and will comply with both the strong and the weak principles, since now the subset $P(r)$ contains all and only the strategies s_i by which the maximization of the social utility function W is possible.

V.2   Second lemma: the "stability" of legal rules

The stability of legal rule r will depend on the following two principles: (i) strong principle: the equilibrium point $\bar{s}$ is a Nash Equilibrium; and, (ii) weak principle: the "generalized non-compliance" of legal rule r must imply a "recognizable harm".

V.2.1   Strong principle: the equilibrium point $\bar{s}$ is a Nash Equilibrium.

According to the first lemma of the theorem (the "reasonability" of legal rules), the legal rule r is deemed to be "reasonable" when its subset $P(r)$ includes all and

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[1] The conclusion assumes that the bureaucrat player does not obtain a maximization of its individual utility function from feeling corrupt and does obtain it from feeling honest.

only strategies s_i by which it is possible to achieve both the maximization of U_i and the maximization of W to some extent at the same time.

In this regard, when the legal rule r is "reasonable", theoretically:

(i) Each player *i* has incentives to comply with the legal rule r if everyone else complies with it.

Since the maximization of individual utility functions U_i and the social utility function W at the same time is possible through all the strategies s_i which are inside the subset $P(r)$ when the legal rule r is "reasonable", the use of any of them by a player *i* will necessarily imply the mediate maximization of its individual utility function U_i and the mediate maximization of the social utility function W to some extent.

In this regard, the use of strategies s_i which are inside the subset $P(r)$ by all players *i* (i.e., the "generalized compliance" of legal rule r) will generate a mediate maximization of the social utility function W that will necessarily grant a mediate benefit to each player *i*.

Therefore, theoretically, each player *i* has incentives to comply with legal rule r (i.e., to use strategies s_i inside the subset $P(r)$) if everyone else complies with it, since its "generalized compliance" (i.e., its compliance by all players *i*) necessarily grants a mediate benefit which will be reflected in a mediate maximization of its individual utility function U_i.

(ii) No player *i* has incentives to not comply with legal rule r if the other players do comply with it.

Since the maximization of the individual utility functions U_i and the social utility function W at the same time is only possible by using strategies s_i which are inside the subset $P(r)$, the use of any strategy s_i outside the subset $P(r)$ by any player *i* will imply the immediate maximization of its individual utility function U_i but will necessarily imply the mediate minimization of the social utility function W to some extent.

In this regard, the use of strategies s_i which are outside the subset $P(r)$ by all players *i* (i.e., the "generalized non-compliance" of the legal rule r) will generate a mediate minimization of the social utility function W which will necessarily bring a mediate harm to each player *i* (which will be greater than the immediate benefit obtained from the immediate maximization of its individual utility function U_i derived from choosing a strategy s_i outside the subset $P(r)$).

Therefore, theoretically, no player *i* has incentives to not comply with the legal rule r (i.e., to use strategies s_i outside the subset $P(r)$) if the other players are complying with it, since its "generalized non-compliance" (i.e.,

its non-compliance by all players *i*) will necessarily bring a mediate harm which will be reflected in a mediate minimization of its individual utility function U_i.

When the legal rule r is "reasonable", theoretically: (i) each player *i* has incentives to comply with the legal rule (i.e., to use strategies inside the subset $P(r)$) if the other players *i* are complying with it, and (ii) no player *i* has incentives to not comply with it (i.e. to use strategies outside the subset $P(r)$)) if the other players *i* are complying with it.

Therefore, when the legal rule is "reasonable", its "generalized compliance" represented by the equilibrium point $\bar{s}$ (which implies that all players *i* use strategies s_i inside the subset $P(r)$ using the "prediction function" π) is theoretically a Nash Equilibrium, since:

(i)   All players *i* have incentives to not deviate from the equilibrium point $\bar{s}$ and to comply with the legal rule r while the other players *i* are complying with it.

(ii)   No player *i* has incentives to deviate from the equilibrium point $\bar{s}$ and to not comply with the legal rule r if the other players *i* comply with it.

Therefore, policymaker players must ensure that the legal rule r complies with the two principles of the "reasonability" lemma of the legal rules in order to ensure that the equilibrium point $\bar{s}$ represents a Nash Equilibrium and, thus, the legal rule is "theoretically stable".

In this regard, it is mentioned that the legal rule r will be "theoretically stable" since the strong principle assumes that each player *i* has bounded but enough rationality and computation capacity to perceive the lasting mediate benefit (the mediate maximization of its individual utility function U_i) from the "generalized compliance" (which is greater than the immediate maximization from its non-compliance) and the lasting mediate harm (mediate minimization of its individual utility function U_i) from the "generalized non-compliance".

Provided that, theoretically, the strong principle assumes that each player *i* has enough computation capacity to:

(i)   Include in its computation: (a) the lasting mediate benefit from its "generalized compliance", and (b) the lasting mediate harm from its "generalized non-compliance".

(ii)   Decide rationally when computing and grant: (a) a greater relative weight to the lasting mediate benefit from the "generalized compliance" and to the lasting mediate harm from the "generalized non-compliance", and (b) a lower relative weight to the momentary immediate benefit from non-complying with the legal rule r in a specific game.

Notwithstanding, in real life, a lot of players *i* have insufficient computation capacity, thus they are unable of:

(i)   Including in its computation the lasting <u>mediate benefit</u> from the "generalized compliance" and the lasting <u>mediate harm</u> from the "generalized non-compliance", including only the momentary <u>immediate benefit</u> from non-complying with the legal rule r in a specific game.

(ii)   Deciding rationally when computing, thus they grant: (1) lower or no relative weight to the lasting <u>mediate benefit</u> from the "generalized compliance" and the lasting <u>mediate harm</u> from the "generalized non-compliance", and (2) a greater or only relative weight to the momentary <u>immediate benefit</u> from non-complying with the legal rule r in a specific game

In this regard, policymaker players cannot guarantee the "generalized compliance" of the legal rule r even when they have ensured that the legal rule r is "reasonable" and "theoretically stable".

V.2.2   Weak principle: the "generalized non-compliance" with the legal rule r implies a "recognizable harm".

(i)   The "recognizable harm".

It is natural to think of imposition of sanctions when trying to determine how to avoid the "generalized non-compliance" of legal rules.

However, since there is no State with enough resources to monitor the compliance of every legal rule in every case, citizens will comply with them "satisfactorily" but not optimally, provided that they will comply with them only to avoid the cost of sanctions but not because they understand that its "generalized compliance" will have a mediate benefit.

In this regard, a first impression related to the compliance of legal rules by the majority of citizens is that they seem:

(a)   To be aware of the utility of complying with legal rules related to fundamental rights (e.g., life and freedom), since they would perceive the mediate harm from its "generalized non-compliance" (that's why murders and kidnappings are an exception and not the rule).

(b)   Not to be aware of the utility of complying with legal rules related to non-fundamental rights (e.g., copyrights, intellectual property and compliance with administrative procedures), since they would not perceive the mediate harm from its "generalized non-compliance" (that's why buying bootlegs DVDs, non-complying with transit legal rules and committing acts of corruption are not the exception but the rule).

Therefore, a first conclusion is that the "generalized compliance" of legal rules must not depend on an exogenous factor such as the imposition of sanctions (which depends on the control carried out by a third party on them and brings "satisfactory" but not "optimal" compliance) but on an endogenous factor (which depends on the control that they carry out on themselves) which we call "recognizable harm".

Moreover, it has been mentioned that the "generalized non-compliance" of a legal rule r which is "reasonable" necessarily implies a mediate harm for

each player *i* in all cases, thus every one of them will theoretically have incentives to comply with it.

However, it has been mentioned that, when a legal rule r is "reasonable", it is only "theoretically stable", since the majority of players *i* is bounded rational and has insufficient computation capacity, thus they are unable of:

(i)   Including in their computation the lasting <u>mediate harm</u> from the "generalized non-compliance" of the legal rule r, including only the momentary <u>immediate benefit</u> from non-complying with the legal rule r in a specific game, due to the fact that: (1) in the worst case, they do not recognize the mediate harm, or (2) in the best case, they recognize it as a harm to a system or a group, but not to themselves.

(ii)   Decide rationally when computing, thus they grant: (1) a lower or no relative weight to the lasting <u>mediate harm</u> of the "generalized non-compliance" of the legal rule r, and (2) greater or only weight to the momentary <u>immediate benefit</u> from non-complying with the legal rule r in a specific game.

In this regard, policymaker players cannot guarantee the "generalized compliance" of the legal rule r even when they have ensured that it is "reasonable" and "theoretically stable", since the non-compliance of the legal rule by bounded rational players *i*: (a) does not entirely depend on the "reasonability" or "theoretic stability" of the legal rule, and (b) partially depends on their incapacity to: (1) in the worst case, recognize the lasting mediate harm of its "generalized non-compliance", or (2) in the best case, recognize such harm as a harm to themselves.

Therefore, policymaker players must: (a) first, ensure that the legal rule r is "reasonable" and "theoretically stable", and (b) second, carry out the computation for players *i*, thus the mediate harm of the "generalized non-compliance" of the legal rule r is perceived by them as a "recognizable harm".

Finally, our understanding is that it is preferable to communicate the mediate harm of the "generalized non-compliance" of the legal rule r as a "recognizable harm" rather than communicate the mediate benefit of its "generalized compliance". In this regard, if policymaker players prefer to communicate the mediate benefit rather than the "recognizable harm", players *i* would be encouraged to carry out a simple opportunity cost analysis by comparing the immediate benefit of its non-compliance to the mediate benefit of its "generalized compliance", preferring the first due to the fact that it is immediate even when the second is greater.

(ii)   The conversion of the mediate harm in a "recognizable harm"

Policymaker players must carry out the computation for players *i*, thus the mediate harm of the "generalized non-compliance" of the legal rule r is perceived by them as a "recognizable harm".

In this regard, to carry out the conversion of the mediate harm of a legal rule r in a "recognizable harm", policymaker players must carry out the following process:

(a) First, determine which the mediate harm of the "generalized non-compliance" of the specific legal rule r is.

For instance, in the case of transit legal rules, players i do not perceive that:

(1) When there is a situation of "generalized compliance" of these rules, all players reach their destinations at t' everyday, with an individual utility function u'.

(2) When there is a situation of "generalized non-compliance" of these, all players reach their destinations some days at t' and some days at t, with an individual utility function u, provided that $t'<t$ and $u'>u$.

Therefore, the mediate harm of the "generalized non-compliance" of transit legal rules is to reach destination some days at t' and some days at t.

(b) Second, carry out the computation for players i, converting the mediate harm of the "generalized non-compliance" of the legal rule r into a "recognizable harm".

Once the mediate harm of the "generalized non-compliance" is identified, policymaker players must convert it into a "recognizable harm".

Policymaker players must let them note that the mediate harm (unrecognizable or recognizable as harm to a system or a group of persons) really is an immediate harm to themselves.

For instance, in case of transit legal rules, the mediate harm of their "generalized non-compliance" is to reach destination some days at t' and some days at t.

In this regard, most players i assume that traffic is stable, thus they do not perceive it as a mediate harm derived from their non-compliance of transit legal rules but as an variable inherently related to transit and, therefore, they do not perceive the incentives for complying with transit legal rules.

Therefore, policymaker players must let them note that traffic is not a stable variable[2] and that their non-compliance of a transit legal rule in a specific case to reach their destination at t' in a specific day is generating the traffic that make them arrive at t any other days (and, maybe, even the same day of the non-compliance), thus they are making a harm to themselves which implies to assume the greater

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[2] For instance, users seem to assume that the delay when carrying out a bureaucratic proceeding is a stable variable of the bureaucratic system. However, the delay is a mediate harm generated due to the fact that some users pay bribes to bureaucrats in order to obtain results in less time, delaying the procurement of results in relation to other users which do not pay bribes and, also, in relation to themselves with respect to future bureaucratic proceedings, since bureaucrats do not have infrastructure enough to speed up a particular bureaucratic proceeding without delaying others.

costs of the lasting mediate harm (e.g., lost sleep time, unwanted delays, unpaid working time, for life) to obtain the lower incomes from the momentary immediate benefit of their non-compliance (e.g., saving time in a day, which maybe they do not obtain).

On the other hand, a minority of players *i* can perceive that traffic is not a stable variable and that it is generated by their non-compliance of a transit legal rule in a specific case to reach destination at *t'* in a specific day. Notwithstanding, they recognize it as a harm to a system or a group of persons and, therefore, they do not perceive the incentives to comply with transit legal rules.

However, by means of the computation carried out by policymaker players, these players *i* will understand that the mediate harm that they recognized as harm to a system or a group of persons is really harming themselves.

Therefore, the mediate harm of the "generalized non-compliance" of transit legal rules which was not recognizable before (and was even deemed to be a stable variable) or was recognizable as harm to a system or a group of persons is now a "recognizable harm" to players *i*.

Note that the information does not need to be necessarily precise, since players *i* will assume that it is correct provided that policymaker players do not incur in an obvious exaggeration, thus they must comply with the "credible authority" rule and the "non-hyperbole" rule described in paragraph (d).

(c)   Third, carry out the comparison between the immediate benefit from the non-compliance of the legal rule r and the "recognizable harm".

Due to the insufficient computation capacity of players *i*, knowing the "recognizable harm" would not be enough for them to choose to comply with legal rule r, since they are not able of carrying out the comparison between the momentary immediate benefit and the lasting "recognizable harm" from their non-compliance.

Therefore, policymaker players must carry out the computation of comparing the momentary immediate benefit and the lasting "recognizable harm" from their non-compliance, thus each player *i* can clearly perceive the difference between the lower incomes from the momentary immediate benefit of their non-compliance and the greater costs from the lasting "recognizable harm".

(d)   Fourth, communicate the comparison between the immediate benefit from the non-compliance of the legal rule r and the "recognizable harm" to players *i*.

Once this comparison has been carried out, policymaker players must present the results of their computation to players *i* under two rules:

(1)   First rule: the "credible authority" rule

Players *i* must perceive that the authority that communicates the computation and the used means: (1.1) do not want to obtain a maximization of their individual utility functions from the communication of the computation, and (1.2) just want the maximization of the social utility function when communicating the computation.

When players *i* perceive that the authority or the used means want to obtain a maximization of their individual utility functions from the communication of the computation, they tend to assume that the strategy that is proposed to use is not "reasonable" and is not inside the subset $P(r)$ (even if it is "reasonable" and it is inside such subset), since they just assume that it only maximizes the individual utility function U_i of the authority or the used means and does not maximize the social utility function W.

For instance, currently it seems to be a situation of "generalized non-compliance" of the legal rule "do not buy bootleg DVDs" in most Latin American countries, which implies different mediate harms such as the production of less movies and the arrival of less of them to local theaters.

Players *i* seem to not perceive these mediate harms or to perceive them as harm to a system (the producers, which they assume are not affected since they are "humongous" companies) but not to themselves.

However, there is another mediate harm that policymaker players could convert in a "recognizable harm": to buy bootleg DVDs and carry out acts of plagiarism are two different representations of the same general obligation "do not copy" of the moral code contained in two different legal rules or in a legal rule and a moral rule, respectively, if it is a minor act of plagiarism.

Therefore, the non-compliance of the legal rule "do not buy bootleg DVDs" could compromise the compliance of other legal and moral rules representing the general obligation "do not copy" of the established moral code.

On 2007, the spot denominated "dad, I got a fake A+" was broadcasted in every theater in Peru.

By means of it, policymaker players pretended to communicate the "recognizable harm" of "buying bootleg DVDs" in a simple manner to players *i*, making them aware that the non-compliance of the legal rule "do not buy bootleg DVDs" encourages the non-compliance of the legal and moral rule "do not plagiarize" by their children.

However, the spot was broadcasted on behalf of companies owning movie theaters and at their own movie theaters, thus players *i* doubted that the proposed strategy (i.e., do not buy bootleg DVDs) was "reasonable" and was inside the subset

$P(r)$ and perceived that the authority and the used means wanted to obtain a maximization of their individual utility functions from the communication of the computation of the "recognizable harm" and did not necessarily want the maximization of the social utility function when communicating it.

Under the rule of "credible authority", the spot would have reduced the "generalized non-compliance" of the legal rule "do not buy bootleg DVDs" if it has been broadcasted by an unrelated non-governmental organization and using adds at newspapers or, even, TV.

(2) Second rule: rule of "non-hyperbole".

Players i must perceive that the "recognizable harm" communicated by the authority using the means is not being exaggerated.

In this regard, when players i perceive that the "recognizable harm" communicated by the authority using the means is exaggerated, they tend to assume that the proposed strategy is not inside the subset $P(r)$ (even if it really is), since they just assume that it is impossible or ridiculous to think that any strategy inside the subset can maximize the social utility function W to such extent.

For instance, an English TV spot by means of which the government tried to communicate the "recognizable harm" of using the cell phone while driving to English drivers was broadcasted on 2009.

In the spot, the action of using the cell phone generated multiple accidents and an unthinkable police mobilization.

Under the "non-hyperbole" rule, the spot would have reduced the "generalized non-compliance" of the legal transit rule "do not use the cell phone while driving" if it would have been broadcasted without exaggerating the consequences of the accident.

An adequate manner to eliminate the hyperbole and to obtain the reduction of non-compliance levels could be to show the real consequences of the non-compliance and to provide either real or fake statistics (as long as a "credible authority" provides the statistics and the "non-hyperbole" rule is not breached).

Bibliography

(1)   AUMANN, Robert J. and HART, Sergiu, "Handbook of Game Theory with economic applications", Volume Nr. 1, North Holland, USA, 1992.

(2)   AUMANN, Robert J., "Perspectives on Bounded Rationality", in "Theoretical Aspects of Reasoning about Knowledge" (Proceedings of the Fourth Conference, TARK), 1992.

(3)   AUMANN, Robert J., "Rule Rationality versus Act Rationality", in http://www.ratio.huji.ac.il/dp.php, Center for the Study of Rationality, The Hebrew University of Jerusalem, Discussion Paper Nr. 497, Israel, 2008.

(4)   AUMANN, Robert J., "Game Engineering", in http://www.ratio.huji.ac.il/dp.php, Center for the Study of Rationality, The Hebrew University of Jerusalem, Discussion Paper Nr. 518, Israel, 2009.

(5)   AUMANN, Robert J., "Consciousness", in "Life as We know It" by J. Seckbach, Springer, USA, 2006, p. 555.

(6)   BAIRD, Douglas; GERTNER Robert; PICKER, Randal, "Game Theory and the Law", Harvard University Press, USA, 1995.

(7)   FLORES, Guillermo; MENDIGHETTI, Alejandro; and NECOCHEA, Romina, "Corruption Efficiency: Corruptible Bureaucratic Systems and Implementation of Governmental Solutions" (*Eficiencia de la Corrupción: sistemas burocráticos corruptibles e implementación de soluciones gubernamentales*), in *Foro Jurídico* (Peruvian Law Journal), Volume Nr. 8, Lima, Peru, 2008, p. 155.

(8)   HARSANYI, John C., "Game and Decision Theoretic Models in Ethics", in "Handbook of Game Theory with economic applications" edited by Robert J. Aumann and Sergiu Hart, Volume Nr. 1, North Holland, USA, 1992.

(9)   NASH, John F. Jr., "Non-Cooperative Games", in Annals of Mathematics, Nr. 54, USA, 1951.

(10) NASH, John F. Jr., "The Bargaining Problem", in Econometrica, Nr. 18, The Econometric Society, USA, 1950.

(11) RAIFFA, Howard and LUCE, Duncan, "Games and Decisions: Introduction and Critical Survey", Dove Publications, Inc., USA, 1989.

(12) RUBINSTEIN, Ariel, "Modeling Bounded Rationality", The Massachusetts Institute of Technology (MIT) Press, USA, 1998.

(13) VON INHERING, Rudolf, "The Purpose of Law" (*El Fin en el Derecho*), Editorial Heliasta S.R.L., Buenos Aires, Argentina, 1978.