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"Circumvention of Law and the Hidden Logic Behind it"

Leo Katz

University of Pennsylvania

Alvaro Sandroni

Northwestern University

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Leo Katz *   Alvaro Sandroni †

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Abstract

The law is full of circumvention maneuvers that lawyers try to exploit and authorities try to suppress. We prove formal results showing that all reasonable legal systems are necessarily extremely manipulable by open schemes that require no type of misrepresentation and no violation of the law. In addition, anti-evasion rules designed to reduce such manipulation can only have limited success, and cannot be easily justified as constituting an improvement.

*University of Pennsylvania Law School, 3501 Sansom Street, Philadelphia, PA 19104 (e-mail: lkatz@law.upenn.edu).

†Department of Managerial Economics and Decision Sciences, Kellogg School of Management, Northwestern University, Evanston, IL 60208 (e-mail: sandroni@kellogg.northwestern.edu).

1. Introduction

A great deal of what lawyers do could be described by the title of this article—circumvention of law. Other less charitable phrases have been usedl: evasion, loophole exploitation, bad faith conduct, aggressive planning, abuse of law, as well as context-specific labels: tax shelter, forum-shopping, and litigation proofing.

In turn, a great deal of what authorities do—law-makers and judges alike—can be described as trying to stamp out such circumvention. Such efforts are doomed. The cost of doing so would be to turn our legal system into one that has never existed and one that is barely conceivable. The deeper reasons for the manipulability of reasonable legal systems are conceptual and related to the ideas that show the manipulability of all reasonable voting systems, (see Arrow 1950, Sen 1971, Gibbard 1973, Satterthwaite 1975, Spitzer 1979, Easterbrook 1982, Kornhauser and Sager 1986, Chapman 2003, Miller and Rachmilevitch 2014, Dietrich 2016, and Barberà and Gerber 2017 as precursors of our approach), and also related to the ideas explored by Sen 1977 on the relationship between choice functions and utility functions.

The manipulative schemes that we will be using to illustrate our argument are commonplace, and likely to be familiar to many readers. They have all been studied in greater detail and with far more nuance than we will treat them with here. More importantly, they do not generally require any deception. They are engaged in brazenly and not infrequently it would be malpractice for a lawyer not to recommend them to his client. Both the familiarity and the brazenness are puzzling. Why has the law remained so openly manipulable and by schemes that are so well-known? This is the question that we address in this paper. Our argument is that there is simply no reasonable alternative. That is, this paper shows that any reasonable legal system is manipulable. To be sure, many of the manipulative strategies we consider have been alternately blessed and condemned. Some readers may be familiar with significant bodies of regulation that try to limit manipulation by what we call anti-evasion rules. But such anti-evasion measures seem to only have limited success, prompting the question why.

This paper is organized as follows: In Section 1.1, we show a few motivating examples of open legal circumvention that have been studied in the literature. In Section 2, we identify two simple manipulative maneuvers that can circumvent any reasonable legal system: manipulation by expansion and manipulation by contraction.

In section 3, we show that only legal systems that maximize a utility function can avoid these simple manipulation schemes. In Section 4, we show why no reasonable legal system maximizes a utility function. There are two reasons for this: first, the need for the law to accommodate the conflicting interests of different people and to do so in a plausible way, and second, the need to combine different legal doctrines, with resulting counterintuitive interaction effects. We also show that any reasonable legal system is manipulable by both expansion and contraction simultaneously. Hence, these two methods can be combined to successfully manipulate the law in multiple ways. In section 5, we consider anti-evasion laws. We show that the same conceptual difficulties that make any reasonable law manipulable also render anti-evasion rules incapable of eradicating legal manipulability, even if anti-evasion rules were perfectly enforced. Manipulation can be limited, but the price for such limitation turns out to be hard to justify by appeal to some goal that the law is trying maximally to achieve, since the law cannot be represented as maximizing an utility function**.** In Section 6, we discuss the connection between our results and the social choice literature. In section 7, we provide additional examples of manipulation by contraction and expansion. In Section 8, we address manipulation in non-legal settings. In Section 9, we address future research. Section 10 concludes. Proofs are in the appendix.

1.1. Some Standard Cases of Legal Circumvention

We offer here a number of ordinary examples of open legal circumvention considered in the literature. They should, by their very ordinariness, draw attention to how fluid the boundary is between legal circumvention and ordinary legal planning.

(i) Transfer of income producing assets. Income is taxed to those who earn it, whether by working for it or by owning the asset that generates it. If the taxpayer transfers this income, this will usually not relieve him of his tax liability for that income. But if he transfers the asset that generates it–a fairly standard tax minimization maneuver–, the income is now taxed to the new owners of the asset, who will typically be in a lower tax bracket. To be sure, transferring the asset, as opposed to its stream of dividends, is a once-and-for-all step, but that is often inconsequential as far as the taxpayer is concerned. (See Cooper 1980.)

(ii) Asset protection. A vast range of devices are available to remove assets from the reach of creditors, most worryingly involuntary creditors, such as tort victims. While heavily regulated, these devices remain potent enough that one scholar has claimed that they will eventually spell "The Death of Liability"—which is the title of Lynn Lopucki's memorable piece. (See Lopucki 1996.)

(iii) Indemnification and insurance. Consider an officer held liable for breaching one of his fiduciary duties to the company in a derivative law suit (i.e., brought in behalf of the corporation). The corporation in many states is not allowed to indemnify him, or make advance commitments to that effect, but is nevertheless frequently permitted to buy Directors and Officers Liability Insurance that covers that contingency. Moreover, the premiums to the insurer can be similar enough (at least in the long run, and perhaps in the short run) to what they then refund to liable officers. The bizarre nature of this becomes conspicuous when, as has happened, the insurer is a subsidiary of the corporation, possibly set up to get around the indemnification ban. To be sure, insurance and indemnification are not functionally the same, but the former may be a good-enough substitute for the latter. Indeed it has been so regarded by the corporations who resort to it, and by commentators who have professed great puzzlement that the law should allow insurance while forbidding indemnification. (See Kamar 1999.)

(iv) Contrived Defenses: This refers to someone who provokes an attack on himself so he can injure the attacker in self-defense, or who arranges for circumstances such that he gets to commit a crime with impunity because he finds himself in a situation of necessity or duress or diminished capacity. (See Robinson 1985.)

(v) Finally, consider this strategy for converting negligence into a mere accident: Imagine a manufacturer engaged in a process that produces, with statistical certainty, negligent behavior on the part of his employees or himself, with resulting harm, which he would be liable for civilly and possibly criminally. Suppose now he replaced the human agents with a machine that performed the same task, the best of its kind, but with an accident rate equal to that obtained by human agents. The accidents that still occurred would now not be viewed as the product of either negligence or any defect in the product. He would therefore not be liable for them. (See Grady 1989.)

2. Fundamental Types of Legal Manipulation

In this section, we set out a formal model of a legal system. We picture the law as a choice function that tells us which options, among a feasible set of alternatives facing a decision-maker, are legal. Let A be a finite set. Let $\mathcal{B}$ be the set of all non-empty subsets of A. We refer to a set $B \in \mathcal{B}$ as an *issue*. An element of an issue is called an *option* or an *alternative*. A *legal system* L is a mapping $L\colon \mathcal{B} \longrightarrow \mathcal{B}$ such that $L(B) \subseteq B$ for every $B \in \mathcal{B}$. So, L is a choice function, and $L(B)$ are the legal alternatives when the available options are given by B. Let $I(B) \subseteq B$ be the complement of $L(B)$ in B. That is, $B = L(B) \bigcup I(B)$ and $L(B) \bigcap I(B) = \varnothing$. So, $I(B)$ are the illegal options in B. When all options in B are legal, $I(B)$ is empty. We may refer to L as a *law*.

We will identify two types of manipulation that we believe to be fundamental: manipulation by contraction and manipulation by expansion. As will be subsequently shown, these manipulation schemes are inevitable features of any reasonable legal system. Informally, manipulation by contraction is the possibility of making a previously illegal option legal through the removal of other options from the choice set.

Definition 1. *A legal system L* ***cannot be manipulated by contraction*** *if*

$$L(B) \bigcap I(B^*) = \varnothing$$

for any pair of issues B and B^*such that $B \subset B^*$and $L(B^*) \bigcap B \neq \varnothing$.

Moving from B^* to B is a reduction of options (because $B \subset B^*$). However, not all legal options in B^* are removed if $L(B^*) \bigcap B \neq \varnothing$. This follows because, by definition, an option $y \in L(B^*) \bigcap B$ is legal in B^* and remains available in B. Finally, any option $x \in L(B) \bigcap I(B^*)$ is an illegal alternative in B^* that becomes legal in B. In this case, a law-abiding citizen (i.e., someone who chooses among legal options) can circumvent the law by removing some options (though not all legal options) from the original option set B^*. Thus, if $L(B) \bigcap I(B^*) \neq \varnothing$ for some pair of issues such that $B \subset B^*$ and $L(B^*) \bigcap B \neq \varnothing$, then L can be *manipulated by contraction*.

Non-manipulability by contraction of a legal system L is equivalent to L satisfying Sen's celebrated property $\beta(+)$. Sen (1977) defines $\beta(+)$ as follows:

Property $\beta(+)$: If x belongs to $L(B)$ and y belongs to B which is a subset of B^*, then x must belong to $L(B^*)$ if y does.

Thus, we use Sen's property $\beta(+)$ to define non-manipulability by contraction. It is a property generally viewed as an intuitively appealing feature of rational choice, and yet the law turns out to routinely violate it.

Example of manipulation by contraction: Consider a decision-maker under deadly attack. He has three options: (x) to kill his attacker; (y) to allow himself to be killed; or (z) to escape. The first option (x) is illegal and the latter two options (y and z) are legal. Now eliminate (z) the possibility of escape. If the options are (x) to kill or (y) to be killed, the law will render the initially illegal kill option x legal.

Necessity and duress operate in the same way: If I am pressured to commit a serious crime (x) and I can avert that by either being subjected to great physical pain (y) or suffering the destruction of property I greatly value (z), I am expected to give up my property rather than commit the requested crime. In other words, committing the sought-after crime x is illegal. Now subtract the option z of losing my property, so that the choice comes down to great physical pain y or assisting in the crime x: assisting in the crime is now legal. The reason for manipulation by contraction is not that I would otherwise be left without any legal options, because the contraction has not removed all legal options, but rather that when his options are limited enough, the law forecloses fewer of them than when they are not.

In this example, the law is

$$L(x,y) = x,y;\ \ L(y,z) = y,z;\ \ L(x,z) = z;\ \ L(x,y,z) = y,z; \tag{2.1}$$

the issue B^* is x,y,z and B is x,y. When z is removed, B^* moves to B and x becomes legal. So, $L(B^*) \bigcap B \neq \varnothing$ and $x \in L(B) \bigcap I(B^*) \neq \varnothing$. Thus, L can be manipulated by contraction. This creates an incentive to circumvent the law by removing options (e.g., z). Whether and when this works will in part depend on whether the law meets such a maneuver with anti-evasion rules, which might provide that x is to stay illegal in x,y if z was previously available. We address this matter in section 5. For now, we explore how the law can be manipulated *in the absence of anti-evasion rules.*

Let's now consider manipulation by expansion. Informally, manipulation by expansion is the possibility of making a previously illegal option legal by adding (rather than subtracting) other options. Formally,

Definition 2. *A legal system L* ***cannot be manipulated by expansion*** *if*

$$I(B) \bigcap L(B^*) = \varnothing$$

for any pair of issues B and B^* such that $B \subset B^*$.

Moving from B to B^* is an option increase (because $B \subset B^*$). If there is an option $x \in I(B) \bigcap L(B^*)$, then, by definition, x is an illegal alternative in B that becomes legal in B^*. In this case, a law-abiding citizen can circumvent the law by adding options and not exercising them. The role of the new options is to change the status of an existing alternative from illegal to legal. Thus, if $I(B) \bigcap L(B^*) \neq \varnothing$ for some pair of issues such that $B \subset B^*$, then L can be *manipulated by expansion.*

Non-manipulability by expansion of a legal system L is equivalent to L satisfying Sen's celebrated property α. Sen (1977) defines α as follows:

Property α : For all B and B^*, with B a subset of B^*, any x that belongs to B and to $L(B^*)$, belongs to $L(B)$.

Thus, we make use of Sen's property α to define non-manipulability by contraction. Sen 1977 notes that "property α has been widely used as a fundamental consistency requirement of choice" (see also Matsuyama 1985 for additional remarks on these axioms). And yet, the law routinely violates property α.

Example of manipulation by expansion: The most straightforward example of manipulation by expansion occurs in connection with the phenomenon of circular priorities. These are instances of "pure" legal cycles of the form

$$L(x, y) = x;\ L(y, z) = y;\ L(x, z) = z.$$

O, the owner of some land, sells it to buyer Bx. Bx is supposed to record his purchase in a land register, but fails to do so. O then fraudulently sells the same land to By who records his purchase. By knew that Bx bought the land. Therefore, Bx has priority over By in a subsequent dispute with Bx. (Bad faith defeats the first-to-record-wins principle.) Now O sells the land for a third time, to Bz. Bz does not check for prior purchases in the land register, but does record his own purchase. By is not informed about Bz's purchase. So, Bx has priority over By (because By knew about Bx's purchase), By has priority over Bz (because By made his purchase and recorded his claim prior to Bz), and Bz has priority over Bx (because Bz recorded and Bx did not, and Bz knew nothing of Bx's purchase).

A more common version of a pure legal cycle occurs in secured transactions, when O gets a loan from Bx, giving Bx a secured interest in O's property as collateral, which Bx however does not record as he is supposed to. Next O borrows from By, using the same collateral, and since By knows about the prior loan, he is now second in line. Unlike Bx, By records his interest. Next O borrows from Bz, giving him too a secured interest in the property. Bz records his interest, unaware of Bx. Thus here too Bx has priority over By, By over Bz, and Bz over Bx.

In a pure legal cycle, the law is manipulable by expansion regardless of which options are legal when all three alternatives x,y,z are available. This follows because any legal option in x, y, z (e.g., $x \in L(x, y, z)$) is illegal in one binary subset of x, y, z (e.g., $x \notin L(x, z)$). In this case, Bx looses in a direct dispute with Bz, but Bx wins if he brings By into the picture. Formally, consider a pure legal cycle and $x \in L(x, y, z)$. B is x, z and B^* is x, y, z. When y is added, B moves to B^* and x becomes legal. So, $x \in I(B) \bigcap L(B^*) \neq \varnothing$. Thus, L can be manipulated by expansion. This creates an incentive to circumvent the law by adding options (e.g., y).

We chose this example for its transparency. There are, however, quite generic examples of manipulation by expansion involving other, clearly essential doctrines, and not involving pure cycles. We present those in Section 7 after we have gotten to our basic results. Moreover, even pure cycles of the circular priority variety are not as unusual as they may seem. Temkin 2012 shows them to be common to certain balancing judgments in the moral domain, many of which have counterparts in law, most notably in the weighing judgments made in the law of negligence.

A legal system L is *manipulable* if at least one of the following is true: (i) L can be manipulated by contraction, (ii) L can be manipulated by expansion, (iii) L can be manipulated by expansion and L can be manipulated by contraction. That is, manipulable legal systems are the ones manipulable by expansion or by contraction, or by both methods simultaneously in which case the legal system is *extremely manipulable*.

One might wonder whether there are other methods of legal manipulation (beyond expansion and contraction). We focus on the basic schemes of contraction and expansion because they *suffice* for open manipulation of *any* reasonable legal system. Thus, additional methods of legal manipulation would merely reinforce our main arguments. In section 5 and in appendix A, we examine other forms of legal manipulation and their relationship to these fundamental types, but for now we limit attention to these two basic schemes. With this in mind, we define non-manipulability of legal systems.

Definition 3. *A legal system L is* **non-manipulable** *if L satisfies the two following properties simultaneously: (i) L cannot be manipulated by expansion, (ii) L cannot be manipulated by expansion.*

Definition 4. *A legal system L is* ***not extremely manipulable*** *if L satisfies at least one of two following properties: (i) L cannot be manipulated by expansion, (ii) L cannot be manipulated by expansion.*

3. The Correlates of Manipulability

We will now seek to characterize the legal systems that can be manipulated. A legal system is rationalizable by a preference if there is a ranking P (also referred to as a weak ordering, see Arrow 1959) that ranks all theoretically possible alternatives from top to bottom and the legal options are the highest ranking ones, among the feasible ones. An option outranked by another is illegal. The highest ranking options are not necessarily unique. If two or more alternatives have the same top rank, then they are all legal. Formally, $x \; P \; y$ indicates that option x ranks higher or equal to option y.

Definition 5. *A legal system L is* ***rationalizable by a preference*** *if there is a ranking P such that for every issue B,*

$$x \in L(B) \Leftrightarrow x \; P \; y \;\; \text{for every} \;\; y \in B.$$

An equivalent way to make this definition is as follows: Let $\mathcal{R}$ be the set of real numbers. A legal system L is *rationalizable by a preference* if there is an utility function $u : A \longrightarrow \mathcal{R}$ such that for every issue B, $x \in L(B) \Leftrightarrow u(x) \geq u(y)$ for every $y \in B$. Put yet another way, one should picture a legal system that is rationalizable by a preference as a master list ranking all possible options a decision-maker might face and requiring him to choose the highest ranking of those from the subset facing him. If any are tied for the highest rank, as they well might be, then, and only then, does he get to use his discretion. While we use the economic terminology "rationalizable by a preference," we argue below that, in the case of a legal system, to be rationalizable by a preference is decisively *not* a normatively appealing property.

Sen 1971 shows that a choice function is rationalizable by a preference if and only if it satisfies properties α and $\beta(+)$ simultaneously. Thus, the Manipulation Theorem below is a re-statement of Sen's 1971 results.

Manipulation Theorem A legal system L is not manipulable if and only if L is rationalizable by a preference.

The manipulation theorem shows that if the law is not rationalizable by a preference, then it can be manipulated. What really gives the manipulation theorem its bite is that the drawbacks of being a legal system that is rationalizable by a preference are so severe that no known or imaginable reasonable legal system can have this feature. This is what we show in Section 4.

4. The Manipulability of All Reasonable Legal Systems

4.1. Responsiveness and Rationalizability

To show that it is manipulable, we only need to demonstrate that a reasonable legal system cannot be rationalized by a preference. To that end, we build on an argument in Katz and Sandroni 2017 who noted that basic doctrines of the law, such as self-defense, necessity, duress, negligence, are not rationalizable by a preference. Consider duress. The decision-maker is asked to (x) participate in a serious crime, say, a bank robbery, and threatened with (y) severe physical pain unless he complies. The duress defense allows him to comply. Consider now an option (z) of losing a manuscript. If he were threatened with destruction of the manuscript lest he help in the bank robbery, he could *not* claim the duress defense. (For related matters, see Kornhauser and Sager 1986, Chapman 2003, Naeh and Segal 2009, and Temkin 2012.) Thus,

$$L(x,y) = x,y;\;\; L(y,z) = y,z;\;\; L(x,z) = z. \tag{4.1}$$

The law in (4.1) is not rationalizable by a preference (because $L(x,z) = z \Longrightarrow u(x) > u(z)$ and $L(x,y) = x,y;\;\; L(y,z) = y,z \Longrightarrow u(x) = u(z)$ [alternatively, given 4.1, rationalizability by a preference would imply the contradiction $z\ P\ x$ and not $z\ P\ x$]). Such laws arise from what we call the requirement of responsiveness. Suppose a decision-maker faces two alternatives y and z which only affect him. We would expect the legal system to leave that choice to him, based on what we might call a principle of minimal autonomy (or even just the Pareto principle). Thus, both options are legal, i.e., $L(y,z) = y,z$. Now consider a third alternative, x, which entails harm to another person. Assume that the law is to be rationalizable by a preference and that y and z are legal in the binary choice between y and z. If a decision maker D faces a choice between x and y or a choice between x and z, then x must be either legal in both choices or illegal in both choices. Otherwise we get an intransitive ranking, and, hence, the law does not maximize an utility function. In other words, if the law is to be rationalizable by a preference and $L(y,z) = y, z$, then

$$x \in L(x,y) \Longleftrightarrow x \in L(x,z). \tag{4.2}$$

Next consider what we call the requirement of responsiveness. If D can harm others or himself, the law should be responsive to how great the harm to each person is. The smaller the harm to D, the more likely it should be that the law would require D to forestall harm to others. But now suppose that x is an option that entails harm to others (and no harm to D), y is an option that entails great harm to D (and no harm to others), and z is an option that entails no harm to anyone (including D). To be responsive, the law must require D to choose z over x, but should permit D to choose x over y. That is, (4.2) does not hold because $x \notin L(x,z)$ while $x \in L(x,y)$. Presumably any reasonable legal system must be responsive to costs and benefits in this way, and thus cannot be rationalizable by a preference. Thus, by the Manipulation Theorem, *any reasonable legal system is manipulable.*

This paper and Katz and Sandroni 2017 explore different conclusions from the idea that the law is not rationalizable by a preference. The main conclusion in Katz and Sandroni 2017 is not about legal manipulation, but rather that (4.1) leads a law-abiding citizen to make cyclic choices: A law-abiding decision-maker who prefers x to y to z, chooses x over y, y over z, and z over x. In this paper, the argument under (4.1) is that if $x \notin L(x,y,z)$, then the law is manipulable by contraction. On the other hand, if $x \in L(x,y,z)$, then the law is manipulable by expansion. Thus, manipulability can follow from the normatively appealing properties that imply (4.1).

In the bank robbery example above, the law satisfies (4.1) and can be manipulated by contraction. This follows because in the bank robbery example, to participate in a crime x is clearly not legal in the issue x, y, z. Here is an example where the interaction of responsiveness and minimal autonomy also leads to (4.1), but this example can generate manipulation by expansion or manipulation by contraction, depending on whether x is legal in the issue x, y, z. Consider a decision maker (D) in a situation where (severe) damage can occur to himself, or to a venerable cathedral (C), or to a gadget (G) that he greatly cares about, but no one else does. Let $x =$ (C damaged, D damaged, G not damaged), $y =$ (C damaged, D not damaged, G damaged), and $z =$ (C not damaged, D damaged, G damaged). A choice between x and y is a choice to damage himself or the gadget (the cathedral is equally damaged in both options). This choice concerns only the decision maker. Thus autonomy here means that D is free to choose between x and y since no one else is affected by his choice. In other words, both options are legal and, hence, $L(x, y) = x, y$.

A choice between y and z is a choice to harm himself or the cathedral (the gadget is equally damaged in both options). Here now responsiveness comes in. If the law assigns to D a sufficiently strong claim to his physical integrity, then D should be allowed to save himself at the expense of the cathedral. D is of course also free to choose to save the cathedral instead. That is, $L(y, z) = y, z$.

A choice between x and z is a choice to save the cathedral or the gadget (the decision maker is equally harmed in both options). In this choice, responsiveness is relevant as well. Assume that the cathedral has great social value; the gadget has almost no social value (though the decision-maker may be emotionally attached to it), and the decision-maker has a sufficiently weak claim to the gadget so that he must prioritize the cathedral. Under these premises, damage to the cathedral is not permitted. That is, $L(x, z) = z$ [Naturally, there are exceptions to this under circumstances which we assume do not apply here].

The critical element in this example is that there is something the decision-maker has a stronger claim to than something else: this is what responsiveness comes to. In our example, the decision-maker is assumed to have a stronger claim to his body than to his gadget. If one claim is sufficiently greater than the other, then the decision-maker may be allowed to save what he has a stronger claim to (his body), but not what he has a weaker claim to (his gadget), when compared to the same social harm (e.g., damage to a cathedral) that the decision-maker would impose on everyone else.

In our example, $L(x, y) = x, y$; $L(y, z) = y, z$; $L(x, z) = z$. That is, (4.1) holds. But in a choice between x, y and z, should x be legal? D is allowed to damage the cathedral to protect himself (i.e., y is legal). But the difference between x and y concerns only the decision maker. So, x should also be legal. This is what autonomy here comes to. And thus the law is here manipulable by expansion. Or one might argue that if the cathedral is to be damaged, D must minimize harm to himself. So, x should not be legal. In this case, the law is manipulable by contraction. Whatever case one finds more persuasive, the law is manipulable. Only the method differs.

Lurking behind these examples is a more general phenomenon that makes for the ubiquitous and extreme manipulability of the law. It is the fact that once doctrines interact with each other, they produce law that is extremely manipulable, even if the individual doctrines were not manipulable. How this happens is what we will demonstrate more formally below. The interaction of autonomy and responsiveness are particular examples of such an interaction.

4.2. Interaction Effects

Let a *doctrine* D be a mapping $D : \mathcal{B} \longrightarrow \mathcal{B} \bigcup \{N\}$ such that properties (i), (ii), and (iii) below hold:

(i) For every $B \in \mathcal{B}$, if $D(B) \neq N$, then $D(B) \subseteq B$;

(ii) $D(B) \neq N$ for some issue B;

(iii) there exists an utility function u such that whenever $D(B) \neq N$,

$$x \in D(B) \Leftrightarrow u(x) \geq u(y) \quad \text{for every} \quad y \in B.$$

A doctrine specifies which choices, among the feasible alternatives, are legal to make. There are, however, situations in which a particular doctrine has nothing to say: A patent doctrine will not have anything to say about self-defense. The expression $D(B) = N$ refers to the case where the doctrine D is non-applicable to the issue B. If $D(B) \neq N$, then the doctrine is applicable. In this case, $D(B)$ are the options that doctrine D deems legal. Hence, property (i) ensures that the set of options that a doctrine deems legal is a subset of the feasible set. Property (ii) ensures that a doctrine is not silent on every issue and, therefore, for at least some issue the doctrine is applicable. Finally, property (iii) ensures that any doctrine can be extended into a legal system that is rationalizable by a preference. Hence, no individual doctrine can be manipulated. This restriction makes the results in this section stronger and clearer because any manipulation that results from aggregating different doctrines cannot be attributed to manipulability of each doctrine. Such manipulation must be attributed to interaction effects among different doctrines.

Let $\mathcal{D}$ be the set of all doctrines and let $\mathcal{L}$ be the set of all legal systems. An *aggregator* is a function $G : \mathcal{D}^m \longrightarrow \mathcal{L}$ that maps a profile of doctrines $(D_1, \ldots, D_m)$ into a legal system L. Given an aggregator G, and a profile $(D_1, \ldots, D_m)$ of doctrines, let $L^{\Delta}G = G(D_1, \ldots, D_m)$ be the final legal system that combines the existing doctrines. An aggregator G *maps doctrines into legal systems that are not extremely manipulable* if $L^{\Delta}G$ is not extremely manipulable for any profile of doctrines $(D_1, \ldots, D_m)$.

Definition 6. *An aggregator G satisfies* ***doctrinal unanimity*** *if for any issue $B \in \mathcal{B}$, $L^{\Delta}G\ (B) = D_k(B)$ whenever these two conditions hold: (i) $D_k(B) \neq N$ for some $k = 1, \ldots, m$; and (ii) $D_i(B) = D_j(B)$ for all $i = 1, \ldots, m$ and $j = 1, \ldots, m$ such that $D_i(B) \neq N$ and $D_j(B) \neq N$.*

An aggregator satisfies doctrinal unanimity if whenever all applicable doctrines agree on what should be legal in an issue, this is the final law on that issue.

Interaction Theorem Assume that there are at least three options, and at least two doctrines. Then, no aggregator satisfies doctrinal unanimity and maps doctrines into legal systems that are not extremely manipulable.

By the Interaction Theorem, it is impossible to aggregate more than one doctrine and assure that the final legal system is not extremely manipulable, even if the doctrines themselves are not manipulable. This result only requires doctrinal unanimity.

Consider the circular priority example in section 2. In that example, x has priority over y, y over z, and z over x. Hence, $L(x, y) = x$; $L(y, z) = y$; $L(x, z) = z$. If, in addition, there is a priority rule when all three alternatives are available, then $L(x, y, z) \neq x, y, z$ and the law is extremely manipulable. This follows because any option that is illegal in x, y, z is also legal in one binary subset of x, y, z and any option that is legal in x, y, z is also illegal in one binary subset of x, y, z.

In this example, extreme manipulation arises through the interaction of the doctrines: First to record wins; Bad faith defeats the first-to-record-wins principle; and the ad-hoc rule used to determine priority when all three options present themselves.

The intuition of the interaction theorem is as follows: Consider three options x, y, and z. Consider a doctrine D_1 that is silent on the issues x, y and y, z and a doctrine D_2 that is silent on the issues x, z and x, y, z. Then, the final legal system $L = G(D_1, D_2)$ must coincide with the only doctrine that is not silent on that issue. That is, L must coincide with D_1 on the issues x, z and x, y, z and L must coincide with D_2 on the issues x, y and y, z. Thus if, for example, $D_2(x, y) = x$ and $D_2(y, z) = y$; $D_1(x, z) = z$ and $D_1(x, y, z) = z, y$, then

$$L(x, y) = x;\ L(y, z) = y;\ L(x, z) = z; \text{ and } \ L(x, y, z) = z, y.$$

The legal system L is extremely manipulable because adding the option x to the issue y, z makes z legal and subtracting the option z from x, y, z makes x legal.

5. Anti-Evasion Rules and their Problems

Many legal systems have tried to prevent manipulation with anti-evasion rules. These come in several varieties and are applied sporadically and unsystematically. The most common ones are those customarily referred to as "form versus substance", "intent to evade", and "spirit versus letter". Other anti-evasion rules are more specifically targeted. The fraudulent conveyance rule is directed at actions taken on the eve of bankruptcy. The actio libera in causa rule deals with actors who create situations of necessity, duress, and the like. The piercing rule deals with exploitation of the limited liability doctrine for corporations. The invited error rule deals with maneuvers during a trial. Certain attribution rules in securities law try to forestall the use of friends and relatives as "strawmen" for their transactions. The anti-structuring rule of the Currency and Foreign Transactions Reporting Act is directed at those who break up a transaction into artificially small units to avoid triggering reporting requirements.

Then there are rules that aren't conceived of as anti-evasion rules, but seem inspired by that desire. Strict liability in torts often seems designed to get at those who, while behaving non-negligently engage in an activity that seems too burdensome for the community at large and thus take advantage of the line negligence law draws between what is sometimes referred to as the "care" level and the "activity level". The unconstitutional conditions rule seems often to be invoked when there is suspicion that the government is converting a power it has into one it does not have. Suppose for instance that the government cannot prohibit certain kinds of speech, but has the power to tax. It might therefore make the severity of the tax burden depend on the taxpayer's willingness to forgo undesirable speech. That's where the unconstitutional conditions rule might come into play. Standing rules seem designed to frustrate collusive litigation and related maneuvers by which parties seek to strategically shape the order in which courts take up controversies. (Stearns 2013).

To understand the effect of these rules, consider a manipulation-by-contraction strategy: the decision maker is under deadly attack. He has three options: (x) kill his attacker, (y) be killed, or (z) escape. Then, x is illegal in x, y, z and legal in x, y. The law can be gamed by removing option z or, in some cases, by waiting until option z is removed by external forces. To counter this, an anti-evasion rule determines that x remains illegal in x, y if z was previously available. With an anti-evasion rule, legality must now depend both on what is available at the time the choice is made and on what was available earlier. Let's say that if x, y, z and x, y are the issues in periods 1 and 2, respectively, then to die (y) is the only legal option at period 2. Self-defense is denied because the escaping option z was available and then removed.

The impossibility of gaming the law at period 1 produces an incentive to game the law before period 1. Let's say that at period 0, either $B = x, y$ or $B^* = x, y, z$ can be selected. For example, assume that it is possible to go to different places at period 0. One place does not have an escape route (issue B). In the other place, escape is possible (issue B^*). In the absence of the anti-evasion rule, x can be legally chosen even if B^* is selected at period 0, because B^* can be changed into B by choosing a place without an escape in period 0. So, the anti-evasion rule at period 1 produces the incentive to game the law at period 0. Naturally, this manipulation strategy can also be made unsuccessful if the law reaches back to period 0 with an anti-evasion rule that makes any choice x remain illegal, if it is illegal in any choice set available at period 0. This creates an incentive to game the law at period -1. Indeed this is a common tactic for circumventing anti-evasion rules: to be more "antecedent" in the preparatory measures. If one distributes assets to favored creditors sufficiently far in advance of bankruptcy, one can often escape the fraudulent conveyance doctrine. If one makes the connection between oneself and a worker sufficiently indirect, one can avoid liability on the grounds that the worker is an independent contractor.

Now the law could reach back beyond period 0, with an anti-evasion rule that makes any choice x remain illegal, if it is illegal in any issue available at period -1. The law could also go further back to period -2. This process could continue forever. But what if the law reaches back indefinitely far to forestall all manipulation?

Let us assume to simplify notation, that there are only two periods: 0 and 1. A menu $M \subseteq \mathcal{B}$ is a non-empty set of issues. At period 0, there is an exogenously given menu M. The issues in M are all the issues that the decision maker can select legally. At period 0, an issue $B \in M$ is selected. At period 1, a final option $x \in B$ is chosen. Given a menu M, an *extended law* L^* is a mapping

$$L^* : M \longrightarrow \mathcal{B}.$$

such that $L^*(B) \subseteq B$ for any $B \in M$. The options $L^*(B)$ are the legal options in period 1 if B is chosen in period 0. Let $I^*(B) \subseteq B$ be the, perhaps empty, set of illegal options in B. So, $I^*(B)$ is the complement of $L^*(B)$ in B.

Definition 7. *An extended law L^* **cannot be evaded** if for any pair of issues $B \in M$, $\tilde{B} \in M$,*

$$I^*(B) \bigcap L^*(\tilde{B}) = \varnothing.$$

Consider an illegal option x in issue B. If the law cannot be evaded, then selecting another issue $\tilde{B}$ and then taking x in $\tilde{B}$ does not make x legal. Thus, if an option is illegal in an issue, one cannot select a different issue to make this option legal.

Consider a criminal who demands that the victim turn over all valuables contained in a safe. To begin with his threats are not menacing enough to warrant the use of deadly force against him: he is not yet threatening violence, merely, say, the disclosure of embarrassing secrets. The victim refuses, and in addition, to eliminate all prospect of imminent compliance destroys the key to the safe. This so enrages the criminal that he becomes violent. So, at period zero, the victim has a choice between the issues $\tilde{B} = \{x, h\}$, $B = \{c, x, y\}$, where x is to kill the criminal, h is to endure great harm, c is to comply and open the safe, y is to endure the initial threat of the criminal. That is, if the victim chooses $\tilde{B}$ at period 0, then at period 1 he can no longer open the safe. He can only either kill the criminal or suffer great harm. On the other hand, if the victim chooses B at period 0, then at period 1, the only possible options are to kill the criminal, open the safe, or suffer the embarrassing disclosure.

Consider the decision to first destroy the key to the safe, i.e., to choose $\tilde{B}$ at period 0, and then suffer great harm h at period 1. No matter how harmful h might be, this will be the only legal option if the law cannot be evaded. If killing the criminal is not self defense when the threat to the victim was mild (i.e., to choose x in B), then to kill the criminal is not self-defense when the only alternative is to suffer great harm (i.e., to choose x in $\tilde{B}$). This example shows an extreme unresponsiveness of laws that cannot be evaded. We now show that all laws that cannot be evaded are unresponsive in this way. Let $\bar{A} = \bigcup_{B \in M} B$ be the set of all options that can be taken.

Definition 8. *An extended law L^* is **strict** if there is a function $i : \bar{A} \longrightarrow \{0, 1\}$ such that for every issue $B \in M$, and option $x \in B \in M$,*

$$x \in L^*(B) \Leftrightarrow i(x) = 1.$$

Strict laws are entirely unresponsive. In strict laws, an option is either legal or illegal, no matter what alternatives were available or how the issue came about. For example, in a strict law, killing someone is either always legal or it is never legal.

Strict laws are a special case of rationalizable-by-a-preference laws. That is, all strict laws are rationalizable by a preference (with a utility function given by i). However, not all rationalizable by a preference laws are strict. Consider, for example, three options x, y and z and a law L^* that is rationalizable by a preference given by $u(x) = 2$, $u(y) = 1$, $u(x) = 0$. Now assume that the issue x, y and the issue y, z are both included in M. Then, the law L^* is not strict because y is legal in y, z $(u(y) > u(z))$ and y is illegal in x, y $(u(y) < u(x))$.

Anti-Evasion Proposition An extended law L^* cannot be evaded if and only if it is strict.

By the anti-evasion proposition, if the law is not strict, then it can be evaded. Self-defense, necessity, duress are not strict laws and hence would be discarded if their exploitation is to be completely eliminated by anti-evasion rules. Even the requirement that one only be punished for actions one could control would be discarded. If someone cannot be held responsible for a choice that was "forced" upon him (i.e., it was out of his control), then he can arrange to have it forced upon him to escape responsibility. The only way to forestall that is a strict law, where it does not matter whether the choice was forced upon him or not.

The anti-evasion proposition thus meshes well with the results in the previous sections. We saw there that if we want to prevent legal manipulation, we would need to require the law to be rationalizable by a preference. But in those results we did not allow the decision maker to eliminate all previously legal alternatives from the choice set that was given to him. In this section, the decision-maker may choose the issue at period 0 and, hence, the decision-maker has additional strategies when choosing menus. In this case, to prevent every type of evasion, we would need to turn the regime into a sub-class of rationalizable by a preference laws: strict laws. Thus, if anti-evasion rules were to prevent every type of legal circumvention, the law would have all the difficulties of rationalizable by a preference laws, and these difficulties may come in even more extreme versions.

Even if anti-evasion rules cannot eradicate manipulation, they can still reduce it, but at a cost: they move the law in the direction of being unresponsive from the moment onwards that these rules apply. The compensating upside to this drawback is hard to pin down and must be investigated in future research. Consider our earlier example involving circular priorities. Here we had three buyers (or borrowers) standing in a cyclical relationship to each other, such that B1 had priority over B2, B2 over B3, and B3 over B1. Assume that B1 prevails if all three of them go to court. Now suppose that when the litigation started only B1 and B3 had been parties to it. B1 would then have lost to B3. Foreseeing this, B1 brings B2 into the litigation (or perhaps just acquires his claim). It is hard to see what compelling principle should forbid doing so with an anti-evasion rule. If the law gives B1 priority over the B2 and B3, when all three go to court, it is hard to see why B1's maneuver should be prevented, at least on the grounds that it sabotages the "real wish" or the "greater purpose" of the law. The same holds for every other type of manipulation. The deeper point is that the same reason that makes the law manipulable, also makes it harder to justify anti-evasion rules. A reasonable legal system is not rationalizable by a preference and, thus, fails to provide a clear ranking for the options that might confront a citizen under its laws. In the absence of such ranking, it is harder to determine what the goal of the law is and, hence, it is harder to appeal to the idea of an overall purpose of the law, if one wants to justify anti-evasion rules. This is a difficulty we intend to address in future work.

6. Connection with the Social Choice Literature

The standard account for legal circumvention ascribes it to over-and under-inclusive rules. Circumvention arises from the gap between the rule and its purpose. The letter of the law points one way, the spirit the other, and lawyers take advantage of that. There are excellent accounts of legal circumvention along those lines. See, among many contributions, Alexander and Sherwin 2004, Bundy and Elauge 1991, Schauer 1993, and Lopucki and Weyrauch 2000. Katz 2010 provides an alternative view.

In this paper, we complement the standard account of legal circumvention. We adapt concepts from the social choice literature to address some long-standing questions about the problem of legal circumvention. Our aim is to use social choice ideas to show that any reasonable legal system must be manipulable. Two key concepts that we adapted are Sen's 1971 properties α and $\beta(+)$. These properties of choice functions have a counterpart in the basic strategies of legal circumvention: manipulation by expansion and manipulation by contraction. In addition, we were inspired by the celebrated impossibility results in the social choice literature (e.g., Arrow 1950) to show that aggregating non-manipulable doctrines leads to manipulable legal systems.

There are, however, formal differences between aggregating doctrines and aggregating individual preferences. For example, when individual preferences are aggregated, social choices can satisfy property $\beta(+)$. Sen (1977, proposition 27) shows a non-dictatorial aggregation process of individual preference orders that satisfies unanimity, independence of irrelevant alternatives, and generates social choices satisfying $\beta(+)$. Sen's idea is that if aggregated social preferences lead to a cycle, then social indifference between all three alternatives preserves $\beta(+)$. To see Sen's point, consider a cycle such as $L(x, y) = x$, $L(y, z) = y$, $L(x, z) = z$. If $L(x, y, z) = x, y, z$, then $\beta(+)$ is satisfied. It is only when $L(x, y, z) \neq x, y, z$ that $\beta(+)$ is violated. In contrast with social choice results, in our legal setting one *cannot* assure that all three options x, y, and z must be legal when they are all available. Thus, the interaction theorem shows that when doctrines are aggregated, both properties α and $\beta(+)$ can be violated. This results in the extreme manipulability of the law.

We now turn to the broad idea of manipulability that followed from the classic results in social choice. The famous Gibbard-Satterthwaite theorem shows the possibility of manipulation, but through strategic misrepresentation of individual preferences. Empirical demonstrations of misrepresentation are discussed in Slemrod 2007 on taxpayers misdescribing their activities, Schneider 2012 on mechanics recommending unnecessary repairs, Crocker and Slemrod 2007 on managers overstating earnings. See also Zitzewitz 2012 for a review on how to detect misrepresentation, and Dhami and al-Nowaihi 2007, 2010, Engström et al. 2015, and Rees-Jones 2018, among many contributions, for behavioral models of tax evasion. These papers clearly show that misrepresentation is indeed a common manipulation tactic. However, our results do not require misrepresentation. We show that the law can be openly manipulated.

Strategies used in agenda manipulation (see Barberà and Gerber 2017 and Dietrich 2016) can more readily be related to our strategies for manipulating the law. A classic way to manipulate a voting agenda is for the agenda-maker to introduce a new option strategically placed according to the voters' preferences. However, there are also differences between law manipulation and voting agenda manipulation. In the latter, it is the authorities, the agenda-setters who do the manipulating, whereas, in direct contrast, in this paper, it is the citizens who do the manipulating–without breaking the law, but all the while undercutting the authorities' efforts to stop them.

7. Further Examples of Legal Circumvention

To drive home the point that there is nothing especially unusual about manipulation by contraction and manipulation by expansion, we offer here some further highly stylized examples of these types of manipulation, which we believe to be representative of larger categories of cases.

Contraction

In a previous example of manipulation by contraction, a person arranges not to have an escape option so that he is left only the choice of dying or killing and hence, can kill in self-defense. There is no dearth of this sort of thing in other areas of law. Political asylum law operates this way. Consider a person who has traveled to the US and faces three options: (x) staying in the US, (y) returning to his autocratically governed home country, becoming a dissident and being punished for it, or (z) returning but living there in peaceful submission**.** The latter two options (y and z) are legal and the first option (x) is illegal. However, if (z) the living-in-peace option is eliminated, perhaps by strategically making a critical statement about one's home government while in the U.S., this will result in the legalization of (x) staying in the U.S.. (Aleinikoff 1991)

Bankruptcy law is another example: Consider a person able to pay his debts with either (z) non-exempt assets or (y) exempt assets (e.g. one's pension). The option (x) of not paying his debts is illegal in the issue x, y, z. But once he removes non-exempt assets from his option set —by using them up or exchanging them for exempt assets– he only has the option (x) of not paying or the option (y) of paying with exempt assets. The law thereupon legalizes the option (x) of non-payment (Baird 1992). In these examples, the law is as in (2.1) and can be manipulated by contraction.

Expansion

A decision maker D is confronted by a robber R. Let $x =$ (D keeps his property, R is killed by D, no harm to D); $z =$ (D loses his property to R, no harm to R and D). A choice between x and z is a choice between keeping his property or killing the robber. In this decision, a choice of x means that when D kills R, R cannot harm or kill D. This follows because D suffers no harm in *both* x and z. The only way to prevent the robbery is to kill R, but this is not legal. Deadly force cannot be employed to protect property. Naturally, there are exceptions to this such as home invasions and others special circumstances which we assume do not apply here. Thus,

$x \notin L(x,z)$. Now assume that $y =$ (D keeps his property, D is seriously harmed by R, no harm to R) is also feasible. In a choice between x, y, and z, if D does not choose z, i.e., if D won't surrender his property to R, then R is going to seriously harm him, i.e., y occurs, unless D instead chooses x and stops R by using deadly force. But this time it may be legitimate to choose x. D may refuse to surrender his property, and given that he can now expect to be seriously harmed by R, he may prevent R from doing so with deadly force. Therefore, $x \in L(x,y,z)$. (Model Penal Code, 3.04 and 3.06). This leads to manipulation by expansion because $x \in I(x,z) \bigcap L(x,y,z)$. In other words, D is not allowed to defend his property with deadly force against a would-be taker, but if a would-be taker gives him the choice between being killed or giving up his property, he may then use deadly force against the would-be taker.

There are some natural concerns with the abstract nature of this example. One possible question is why, in the baseline scenario, doesn't the victim have the obligation to resist with non-deadly force and then if the robber attempts to overcome the victim with deadly force, killing the robber becomes justified? This is a more natural example of legal circumvention, but it involves multiple steps: first to use non-deadly force and then deadly force. Manipulation by expansion (and by contraction) is a one-step process. Hence, the notation in manipulation by contraction and in manipulation by expansion often require a higher level of abstraction to describe specific examples of legal circumvention. In particular, what is more naturally seen as multiple actions unfolding over time must be compressed into a single option.

In appendix A, we show an alternative formalization of legal circumvention (called resequencing) that allows multiple steps in the formal description of circumvention maneuvers. This allows some specific multi-steps examples of legal circumvention to be described in a more natural manner. In appendix A, we revisit the example of first using non-deadly force to stop the robber and afterwards using deadly force when the only alternative left is to endure serious harm. We also show an equivalence result between resequencing and manipulation by expansion and contraction.

Apart from this methodological point, readers may feel puzzled at the motivation of the Model Penal Code. Deadly force is generally only allowed when it is deemed necessary. If someone has the option of retreating rather than killing his attacker, then killing the attacker is generally not judged necessary (though the duty to retreat is a relatively new, and limited, incursion into the right to stand one's ground). Why should it then be legal to use lethal force when the decision-maker could simply give up the property the robber desires? To be sure, the law remains manipulable if there is a duty to relinquish property and the use of lethal force is illegal in the choice between x, y, and z. However, the law would then be manipulable by contraction. The law, as we describe it here, is perhaps guided by the following intuition: consider a duty to relinquish property when the decision-maker foresees that by not relinquishing his property he may end-up having to kill in self-defense. Such a duty to give up property to forestall the use of deadly force in self-defense is hard to distinguish in a principled way from a duty to take all sorts of other antecedent measures which might include the duty to stay out of dangerous neighborhoods, and the duty to not walk into a rowdy bar seductively dressed, when the decision-maker foresees that these actions may lead to a kill or die situation. In this sense, the view that opposes a duty to relinquish property is driven by slippery slope concerns akin to the freedom the law grants someone to not render help even if it could be rendered easily and would greatly benefit the person in need of it. The law doesn't generally require someone to be a good samaritan because failure to aid is hard to distinguish in a principled way from failure to, say, give money to a charity that saves lives. What view one is inclined to take here, will determine the shape one gives the self-defense doctrine, and what method of gaming the law will ultimately be possible.

8. Circumvention in Non-Legal Domains

Circumvention occurs in domains other than law. Consider religious rules, which believers often circumnavigate in much the same manner that law-abiding citizens circumnavigate the positive law. They may respect the prohibition on usury, but dodge it through a sale/repurchase maneuver known as the mohatra contract: the lender "buys" an asset for a price equivalent to the loan and "resells" it to the borrower at the original price plus the equivalent of interest at some specified later date.

A second domain worth noting are rules of personal morality–the most obvious illustration being the inhibition many people feel about lying, while dealing far more comfortably with functionally equivalent indirect modes of deception, such as remaining silent or speaking equivocally.

A third domain are the relatively lawless regimes of autocracies. Yet there is an abundance of examples of successful circumvention under even such regimes. A plethora of examples can be found in James S. Scott's Weapons of the Weak, and in the novels of Solzhenitsyn. Here are just two. Soviet scholars seeking to disseminate forbidden Western writings would sometimes get away with doing so by launching a vituperative attack on such writings, and in the course of doing so quoting them at length. Another strategy involved high-level officials who, worried about being held responsible for some important decision in case it should turn out badly, would "fall ill" on the eve of signing off on the "deal," leaving it to their deputy to sign off. Often the deputy too would "fall ill," and so on. People understood what was going on, but all the same it persisted.

And then there is a fourth domain, the rules of voting, in which agenda manipulation is well-recognized as a pretty much ineliminable possibility of circumvention. Our conceptual approach to legal circumvention is based on social choice concepts and, hence, can be related to the well-known approach of agenda manipulation.

Our account of legal circumvention may help understand why circumvention can occur in non-legal contexts. The idea that reasonable laws cannot be rationalizable by a preference may have a direct counterpart in non-legal domains. In future work, we hope to account for this aspect of non-legal domains more fully.

9. Future Work

All of this suggests new directions for research in both law and economics. Economists are familiar with asymmetric information and lack of verifiability problems. They have not focused much on problems arising out of the manipulability of legal regimes, when everything occurs in the open and no information is lacking.

Our results suggest a different approach to certain long-standing problems in law and economics. Take the indemnification/insurance puzzle mentioned in section 1.1. Scholars have struggled to account for the fact that it is permissible to do by insurance what may not be done by indemnification. A typical suggestion has been that insurance companies may play a monitoring role. Our approach suggests a different answer: In a regime that is not rationalizable by a preference, there are several paths to the same outcome, some illegal, some legal. No specific function is being served by that. Thus, indemnification/insurance puzzle may be a by-product of not living in a regime that is rationalizable by a preference. The main question we intend to investigate in future work is how to evaluate the desirability of laws and policies in the absence of a utility function the law can be said to maximize.

10. Conclusion

In his Devil's Dictionary, Ambrose Bierce includes this definition: "LAWYER, n. One skilled in circumvention of the law." Much of what lawyers do does indeed reek of circumvention, and for good reason. Circumvention is an inevitable by-product of the fact that all reasonable legal regimes are manipulable. This result stems from the need to weigh different interests and the need to aggregate different doctrines.

11. Appendix

11.1. Appendix A: Resequencing

Some sophisticated forms of legal circumvention are really complex combinations of manipulation by expansion and by contraction. To understand these more sophisticated forms of legal circumvention, it is helpful to think of them as a sequence of maneuvers that we call resequencing. The intuitive idea of resequencing is that there might be different ways to move from a status-quo x_0 to an option x_N. Some routes involve only legal moves, while other routes involve illegal moves. The law can then be circumvented by avoiding illegal moves and using only legal routes.

Formally, let a *route* between $x_0 \in B_0$ and $x_N \in B_N$ be a series of choices and issues (x_i, B_i), $i \in \{0,\ldots,N\}$ such that $x_i \in B_i \bigcap B_{i+1}$, $i \in \{0,\ldots,N-1\}$. So, a route between x_0 and x_N are choices that start at x_0 and end at x_N. In any route, x_{i-1} and x_i belong to B_i, $i \in \{1,\ldots,N\}$. This ensures the feasibility of moving from x_{i-1} to x_i.

Given a legal system L, a route $(x_i \in B_i,\ i \in \{0, \ldots, N\})$ between x_0 and x_N is *legal* if $x_i \in L(B_i),\ \ i \in \{1, \ldots, N\}$. That is, the move from x_{i-1} to x_i is legal because x_i is legal in B_i. So, all choices in a legal route are legal. A route $(x_i \in B_i'$, $i \in \{0, \ldots, N\})$ between x_0 and x_N is *mixed* if $x_{i-1} \in L(B_i')$, $i \in \{1, \ldots, N\}$, and $x_k \notin L(B_k')$ for at least some $k \in \{1, \ldots, N\}$. In a mixed route, there is at least one illegal move (the move from x_{k-1} to x_k). A mixed route is a special case of a non-legal route where $x_k \in L(B_{k+1}')$ and so, unless x_k is the terminal option x_N, x_k is legal in the next issue B_{k+1}'. In a mixed route, all moves start in a legal option.

Definition 9. *A legal system L* ***cannot be manipulated through resequencing*** *if there does not exist two different options $z = x_0$ and $x = x_N$, and two routes between z and x such that one of them is a legal route and the other one is a mixed route.*

Resequencing delivers a flexible way to formally describe specific examples of legal circumvention based on several moves. Consider the example where the decision-maker resists theft with non-deadly force and then if the robber attempts to overcome the decision-maker with deadly force, killing the robber becomes justified. This example involves more than one move and is simpler to formalize using resequencing than with expansion and contraction.

Example of manipulation through resequencing: Recall the decision maker D confronted by a robber R. One option is $x = (D$ keeps his property, R is killed by D, no physical harm to $D)$. Other options are $z = (D$ loses his property to R, no physical harm to R and $D)$ and $w = (D$ protects his property using non-lethal force against R, no harm to $D)$. Now consider the issue x, z, w. In this choice, the decision maker cannot be harmed by the robber in any of the options available and can stop the robber from taking his property either by lethal force or by non-lethal force (or let the robber take his property). Given that R cannot harm D, D may not use lethal force against R (i.e., x is illegal in x, z, w). However, D can use non-lethal force legally (i.e., w is legal in x, z, w). Finally, D can allow the robber to take his property (i.e., z is legal in x, z, w). Thus, $L(x, z, w) = z, w$.

This defines a mixed route from $x_0 = z$ to $x_1 = x$, where $N = 1$, $B'_0 = B'_1 = x, z, w$. First, (x_0, B'_0), (x_1, B'_1) is a route between $x_0 = z$ and $x_1 = x$ because $x_0 = z \in B'_0 \bigcap B'_1 = x, z, w$ and $x_1 = x \in B'_1 = x, z, w$. In addition, (x_0, B'_0), (x_1, B'_1) is a mixed route because $x_0 = z \in L(B'_1) = z, w$ and $x_1 = x \notin L(B'_1) = z, w$. Thus, this route starts with a legal option z. That is, in the issue $B'_1 = x, z, w$, it is legal for D to allow the robber to take his property (z). The route ends in the illegal option x of using lethal force against the robber. Hence, (x_0, B'_0), (x_1, B'_1) is a mixed route.

Now assume that after using non-lethal force, R reacts in a way such that lethal force is the only way to for D avoid serious harm to be inflicted on him. Then, lethal force is legitimized. In this sequence of events, after choosing w, option w is replaced by option $y = (D$ keeps his property, D is seriously harmed by R, no physical damage to $R)$. This sequence of events defines a legal route from $x_0 = z$ to $x_3 = x$, where $N = 3$, $x_1 = w$, $x_2 = y$, $B_0 = B_1 = x, z, w$, $B_2 = x, z, w, y$, $B_3 = x, y$. So, (x_0, B_0), (x_1, B_1), (x_2, B_2), (x_3, B_3) is a route between $x_0 = z$ and $x_3 = x$ because $x_0 = z \in B_0 \bigcap B_1 = x, z, w$, $x_1 = w \in B_1 \bigcap B_2 = x, z, w$, $x_2 = y \in B_2 \bigcap B_3 = x, y$, $x_3 = x \in B_3 = x, y$. In addition, (x_0, B_0), (x_1, B_1), (x_2, B_2), (x_3, B_3) is a legal route because $x_1 = w \in L(B_1) = z, w$, $x_2 = y \in L(B_2) = z, w, y$, $x_3 = x \in L(B_3) = x, z, y$.

The laws $L(B_1) = z, w$, $L(B_2) = z, w, y$, $L(B_3) = x, y$ follow because it is legal to let the robber take the property (z), it is also legal to use non-lethal force to protect property (w), and it is legal to endure harm (y). However, the use of lethal force (x) is illegal when the decision maker can protect his property using non-lethal force (i.e., when w is available), but the use of lethal force (x) is legal when the only alternative is to suffer serious harm (e.g., when the issue is $B_3 = x, y$). Finally, note that the issue B_3 could be alternatively defined as $B_3 = x, y, z$. In this case, as long as x is still legal in x, y, z, (x_0, B_0), (x_1, B_1), (x_2, B_2), (x_3, B_3) is a legal route. Given that there are two options $z = x_0$ and $x = x_N$, and two routes between z and x such that one of them is a legal route and the other one is a mixed route, the legal system L can be manipulated through resequencing.

We show a direct connection between resequencing, contraction and expansion.

Equivalence Proposition A legal system L is manipulable by resequencing if and only if L can be manipulable by contraction or by expansion or by both contraction and expansion simultaneously.

The equivalence proposition shows that when manipulation by resequencing is possible, then the law can be manipulated by either expansion, or by contraction or by both methods. In this sense, resequencing is essentially an alternative way to formalize the manipulability of reasonable legal systems.

11.2. Appendix B: Proofs

Proof of the Manipulation Theorem and the Equivalence Proposition: Let L be a legal system. Consider issues B and B^*, $B \subset B^*$. Assume that $\beta(+)$ holds. If there exists $y \in L(B^*) \bigcap B$, then $x \in L(B) \Longrightarrow x \in L(B^*)$. Thus, $L(B) \bigcap I(B^*) = \varnothing$ and L cannot be manipulated by contraction. Now assume that L cannot be manipulated by contraction. If for some $y \in L(B^*) \bigcap B$, then $L(B) \bigcap I(B^*) = \varnothing$. Thus, if $x \in L(B)$, then $x \in B^*$ and $x \notin I(B^*)$. So, $x \in L(B^*)$. It follows that $\beta(+)$ is satisfied. Hence, L satisfies $\beta(+)$ if and only if L cannot be manipulated by contraction.

Assume that α holds. If $x \in B \bigcap L(B^*)$, then $x \in L(B)$. Thus, $I(B) \bigcap L(B^*) = \varnothing$. So, L cannot be manipulated by expansion. Assume that L cannot be manipulated by expansion. So, $I(B) \bigcap L(B^*) = \varnothing$. Hence, $x \in B \bigcap L(B^*) \Rightarrow x \in L(B)$. So, α holds. Thus, L satisfies α if and only if L cannot be manipulated by expansion.

L cannot be manipulated if and only if α and $\beta(+)$ are satisfied. By Sen (1971, p. 314), L is rationalizable by a preference if and only if it satisfies α and β.

Property β If x and y both belong to $L(B)$, and B is a subset of B^*, then x must belong to $L(B^*)$ if y does.

Property $\beta(+)$ is stronger than β because $y \in L(B) \Longrightarrow y \in B$. However, if α holds, then $y \in B \bigcap L(B^*) \Rightarrow y \in L(B)$. If β also holds, then $x \in L(B)$, $y \in B \bigcap L(B^*) \Rightarrow x \in L(B)$, $y \in L(B) \bigcap L(B^*) \Rightarrow x \in L(B^*)$. Thus, α and β hold if and only if α and $\beta(+)$ hold. This shows the Manipulation Theorem.

To show the Equivalence Theorem, assume that L cannot be manipulated. By the Manipulation Theorem, let u be an utility function that rationalizes L. Let ($x_i \in B_i$, $i = 0,\ldots,N$) be a route between x_0 and x_N. So, $x_{i-1} \in B_i$, $i = 1,\ldots, N$. If this route is legal, then $x_i \in L(B_i)$, and $u(x_i) \geq u(x_{i-1})$, $i = 1,\ldots,N$. Thus, $u(x_N) \geq u(x_0)$.

Let ($x_i \in B_i'$, $i = 0,..,N$) be a mixed route between x_0 and x_N. Given that $x_{i-1} \in L(B_i)$, $x_i \in B_i$, $i \in \{1,..,N\}$, it follows that $u(x_{i-1}) \geq u(x_i)$, $i = 1,\ldots,N$. Given that $x_k \notin L(B_k)$ for some $k \in \{1,..,N\}$ it follows that $u(x_{k-1}) > u(x_k)$ for some $k \in \{1,..,N\}$. Thus, $u(x_0) > u(x_N)$. A contradiction. Hence, L cannot be manipulated by resequencing.

Now assume that L can be manipulated by expansion. So, for some pair of issues, B and B^*, $B \subset B^*$, and $I(B) \bigcap L(B^*) \neq \varnothing$. Let $z \in I(B) \bigcap L(B^*)$. Given that $L(B) \neq \varnothing$ there exists $x \in L(B)$. The route between $x_0 = x$ and $x_1 = z$, given by $B_0 = B_1 = B^*$ is legal because $x_1 = z \in L(B^*) = L(B_1)$. The route between $x_0 = x$ and $x_1 = z$, given by $B_0 = B_1 = B$, is mixed because $x_0 = x \in L(B) = L(B_1)$ and $x_1 = z \notin L(B) = L(B_1)$. So, L can be manipulated by resequencing.

Assume that L can be manipulated by contraction. So, for some pair of issues, B and B^*, $B \subset B^*$, $L(B^*) \bigcap B \neq \varnothing$ and $L(B) \bigcap I(B^*) \neq \varnothing$. Let $x \in L(B^*) \bigcap B$ and $z \in L(B) \bigcap I(B^*)$. The route between $x_0 = x \in B_0 = B_1 = B^*$ and $x_1 = z \in B_0 = B_1 = B^*$ is mixed because $x_0 = x \in L(B^*) = L(B_1)$ and $x_1 = z \notin L(B^*) = L(B_1)$. The route $x_0 = x \in B_0 = B_1 = B$ and $x_1 = z \in B_0 = B_1 = B$ is a sequence of legal moves because $z \in L(B)$. So, L can be manipulated by resequencing. ■

Proof of the Interaction Theorem: Let x, y and z be three distinct options. Let $u_1 : A \longrightarrow \mathcal{R}$ be an utility function such that $u_1(y) = u_1(z) > u_1(x)$. Let $u_2 : A \longrightarrow \mathcal{R}$ be a function such as $u_2(x) > u_2(y) > u_2(z)$. Let doctrine D_1 be such that

$$D_1(x, y) = N;\ D_1(y, z) = N;\ D_1(x, z) = z;\ D_1(x, y, z) = z, y,$$

and for any other issue B, $D_1(B)$ are the options that maximize u_1 on B. Let D_2 be a doctrine such that

$$D_2(x, y) = x; \; D_2(y, z) = y; \; D_2(x, z) = N; \quad D_2(x, y, z) = N,$$

and for any other issue B, $D_2(B)$ are the options that maximize u_2 on B. All other doctrines coincide with D_1 or D_2 on any issue $B \subseteq (x, y, z\}$. Let G be an aggregator and let the legal system L be $G(D_1, ..., D_m)$. By unanimity,

$$L(x, y) = x; \, L(y, z) = y; \, L(x, z) = z; \text{ and } \; L(x, y, z) = z, y.$$

Consider the issues $B = \{y, z\}$ and $B^* = \{x, y, z\}$. Then, $z \in I(B) \bigcap L(B^*) \neq \varnothing$. So, L can be manipulated by expansion. Now consider the issues $B = \{x, y\}$ and $B^* = \{x, y, z\}$. Then, $y \in L(B^*) \bigcap B \neq \varnothing$ and $x \in L(B) \bigcap I(B^*)$. So, L can be manipulated by contraction. Thus, L is extremely manipulable.$\blacksquare$

Proof of the Anti-Evasion Proposition: Assume that the extended law L^* cannot be evaded. For $x \in \bar{A}$, let $i(x) = 1$ if and only if $x \in L^*(\tilde{B})$ for some $\tilde{B} \in M$. If $x \in B \in M$ and $x \in L^*(\tilde{B})$, then $x \in L^*(B)$. Otherwise, $x \in I^*(B) \bigcap L^*(\tilde{B}) \neq \varnothing$. Thus, $i(x) = 1$ and $x \in B \in M \Rightarrow x \in L^*(B)$. Now assume that $i(x) = 0$ and $x \in B \in M$. Then, by definition, $x \notin L^*(\tilde{B})$. Hence, L^* is strict.

Assume that L^* is strict. Let $B \in M$ and $\tilde{B} \in M$. If $x \in I^*(B)$, then $i(x) = 0$. If $x \in L^*(\tilde{B})$, then $i(x) = 1$. Thus, $I^*(B) \bigcap L^*(\tilde{B}) = \varnothing$. So, L^* cannot be evaded.$\blacksquare$

References

[1] Aleinikoff, Alexander T. and David A. Martin. 1991. *Immigration: Process and Policy,* 2d ed. St Paul, Minn.: West Publishing.

[2] Alexander, Larry and Emily Sherwin. 2004. *The Rule of Rules*, Duke University Press.

[3] Arrow, Kenneth. 1950. A Difficulty in the Concept of Social Welfare. *The Journal of Political Economy*, 58(4): 328-346.

[4] Arrow, Kenneth. 1959. Rational Choice Functions and Orderings. *Economica*, 26 (102): 121-127.

[5] Baird, Douglas. 1992. *Elements of Bankruptcy*, Westbury, N.Y. Foundation Press.

[6] Barberà, Salvador, and Anke Gerber. Sequential Voting and Agenda Manipulation. *Theoretical Economics* 12(1), 211-247.

[7] Bierce, Ambrose. 1906. *The Devil's Dictionary.*

[8] Bundy, Steve, and Einer Elauge. 1991. *Do Lawyers Improve the Adversary System? A General Theory of Litigation Advice and Its Regulation.* California Law Review 79: 313-420.

[9] Chapman, Bruce. 2003. *Rational Choice and Categorical Reasoning.* University of Pennsylvania Law Review 151: 1169-1210.

[10] Chernoff, Herman. 1954. Rational Selection of Decision Functions. *Econometrica* 22: 423-443.

[11] Cooper, George. 1980. The Avoidance Dynamic: A Tale of Tax Planning, Tax Ethics, and Tax Reform. *Columbia Law Review* 80-8: 1553-1622.

[12] Crocker, Keith J. and Joel Slemrod. 2007. The Economics of Earnings Manipulation and Managerial Compensation, *RAND Journal of Economics*, 38, 698–713.

[13] Dhami, Sanjit and Ali al-Nowaihi. 2007. Why Do People Pay Taxes? Prospect Theory versus Expected Utility Theory. *Journal of Economic Behavior & Organization*, 64, 171–192.

[14] Dhami, Sanjit and Ali al-Nowaihi. 2010. Optimal Income Taxation in the Presence of Tax Evasion: Expected Utility versus Prospect Theory. *Journal of Economic Behavior & Organization*, 75, 313–337.

[15] Dietrich, Franz. 2016. Judgment Aggregation and Agenda Manipulation. *Games and Economic Behavior* 95, 113-136.

[16] Easterbrook, Frank H. 1982. Ways of Criticizing the Court. *Harvard Law Review*, 95: 802-832.

[17] Engström, Per, Katarina Nordblom, Henry Ohlsson, and Annika Persson. 2015. Tax Compliance and Loss Aversion, *American Economic Journal: Economic Policy* 7: 132–164.

[18] Gibbard, Allan. 1973. Manipulability of Voting Schemes: A General Result. *Econometrica* 41-4: 587-601.

[19] Kamar, Ehud. 1999. Shareholder Litigation under Indertermitate Corporate Law. *University of Chicago Law Review,* 66: 887-914.

[20] Kaplow, Louis, and Steven Shavell. 2002. *Fairness versus Welfare*. Cambridge, MA: Harvard University Press.

[21] Katz, Leo and Alvaro Sandroni. 2017. The Inevitability and Ubiquity of Cycling in All Feasible Legal Regimes: A Formal Proof. *Journal of Legal Studies*, 46-2: 237–280.

[22] Katz, Leo. 2010. A Theory of Loopholes. *Journal of Legal Studies,* 39-1: 1-31.

[23] Kornhauser, Lewis A. and Lawrence G. Sager. 1986. Unpacking the Court. *Yale Law Journal* 96: 82-117.

[24] Lopucki, Lynn and Walter Weyrauch. 2000. A Theory of Legal Strategy. *Duke Law Journal* 49-6: 1405-1486.

[25] Matsuyama, M. 1985. Chernoff's Dual Axiom, Revealed Preference and Weak Rational Choice Functions. *Journal of Economic Theory* 35-1, 155-165.

[26] Miller, Alan and Shiran Rachmilevitch. 2014. *Arrow's Theorem Without Transitivity*. Working paper. University of Haifa.

[27] Moulin, Herve. 1985. Choice Functions over a Finite Set: A Summary. *Social Choice and Welfare* 2: 147-160.

[28] Naeh, Shlomo and Uzi Segal. 2009. The Talmud on Transitivity. Working Paper. *Hebrew University of Jerusalem*, Talmud Department, Jerusalem.

[29] Ratzlaff v. United States, 2002. 537 U.S. 853.

[30] Rees-Jones, Alex. 2018. Quantifying Loss-Averse Tax Manipulation. *Review of Economic Studies* 85: 1251–1278.

[31] Robinson, Paul H. 1995. Causing the Conditions of One's Own Defense: A Study in the Limits of Theory in Criminal Law Doctrine. *Virginia Law Review* 71: 1-64.

[32] Satterthwaite, Mark A. 1975. Strategy-proofness and Arrow's Conditions: Existence and Correspondence Theorems for Voting Procedures and Social Welfare Functions. J*ournal of Economic Theory* 10-2, 187-217.

[33] Schauer, Frederick. 1993. *Playing by the Rules*. Oxford: Oxford University Press.

[34] Schneider, Henry. 2012. Agency Problems and Reputation in Expert Services: Evidence from Auto Repair. *Journal of Industrial Economics* 60: 406–433.

[35] Scott, James. 1985. *Weapons of the Weak: Everyday Forms of Peasant Resistance*. Yale University Press.

[36] Sen, Amartya. 1971. Choice Functions and Revealed Preference. *Review of Economic Studies* 38: 307-317.

[37] Sen, Amartya. 1977. Social Choice Theory: A Re-Examination. *Econometrica*. 45-1: 53-88.

[38] Stearns, Maxwell. 2013. Grains of Sand or Butterfly Effect: Standing, the Legitimacy of Precedent, and Reflections on Hollingsworth and Windsor/ *Alabama Law Review* 65: 349-401.

[39] Stiglitz, Joseph. 1988. The General Theory of Tax Avoidance. *National Tax Law Journal* 38-3: 325-337.

[40] Spitzer, Matthew L. 1979. Multicriteria Choice Processes: An Application of Public Choice Theory to Bakke, the FCC, and the Courts. *Yale Law Journal* 88: 717-780.

[41] Temkin, Larry S. 2012. *Rethinking the Good: Moral Ideals and the Nature of Practical Reasoning*. Oxford: Oxford University Press.

[42] Weisbach, David A. 2002. Ten Truths about Tax Shelters. *Tax Law Review* 55: 215-253.

[43] Zitzewitz, Eric. 2012. Forensic Economics. *Journal of Economic Literature*, 50, 731–769.