Wrongful convictions and non-monetary sanctions

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Abstract

There is an ongoing debate in the L&E literature on the impact of type-I errors (wrongful convictions of innocent individuals) on deterrence. Some recent papers also put the question to the experimental test (Marchegiani et al., 2013; Markussen et al., 2014; Baumann and Friehe, 2015). With the present work we improve on the design of Rizzolli and Stanca (2012) in several directions and we test for the first time the effects of non-monetary sanctions on deterrence.

This submission is based on a very early and preliminary draft version of the paper. We are currently running the experimental sessions and we plan to have the paper ready by the end of June.

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1 Introduction and Literature Review

The standard model of optimal deterrence advances some well known predictions on the impact of judicial errors of the two types (wrongful convictions and wrongful acquittals) on deterrence. The model shows that they are both detrimental to deterrence and that they are both equally costly in terms of lost deterrence. Hence, a savvy social planner should care about wrongful convictions no more than he cares about wrongful acquittals. This is contrary to the common wisdom, to the thousands-years old legal scholarship and to the actual construction of modern legal procedures that all seem to hint at the fact that wrongful convictions are much worse mistakes than wrongful acquittals.

There exists an ongoing debate on whether this prediction (that both errors are equally detrimental to deterrence) stands a closer theoretical scrutiny The debate originated with Lando (2006) and was followed by Garoupa and Rizzolli (2013) and Lando and Mungan (2014).

On the other hand several papers have put the same theoretical prediction to the experimental test. Grechenig et al. (2010) first showed that judicial errors greatly undermine deterrence in a voluntary contribution mechanism (VCM) type of game. Rizzolli and Stanca (2012) disentangled the effects found that type-I errors are more detrimental to deterrence than type-II errors but they could not reject the hypothesis that risk-aversion alone could explain this asymmetry. Markussen et al. (2014) using a VCM design found the opposite effect: that type-I errors are less detrimental than type-II errors. Further experimental work on the topic is more peripheral to the present paper and includes Baker et al. (2003); Bar-Ilan and Sacerdote (2004); Baumann and Friehe (2015); Block and Gerety (1995); Bruttel and Friehe (2010); Feess et al. (2014); Galbiati et al. (2013); Khadjavi (2014 forth.); Mueller and Duersch (2013); Nagin and Pogarsky (2003); Nosenzo et al. (2013); Ouss and Peysakhovich (2012); Schildberg-Hörisch and Strassmair (2012); Van Dijk et al. (2012); Harbaugh et al. (2011); Xiao and Tan (2013); Zamir and Ritov (2012); Zeiler (2010)

This experiment is based and extends on Rizzolli and Stanca (2012) It extends the previous work in the following directions.

- it introduces an effort task before the main experiment to increase the saliency of the property rights and of the crime
- it implements non-monetary sanctions through the same tool used for the effort task at the beginning. The sanction resembles some form of forced labour. This allows us to disentangle the effect of standard utility risk-aversion and to study whether nn-monetary sanctions have a specific effect on deterrence
- it adds better controls such as risk-aversion elicitation task, loss aversion task, "cognitive reflection" (Fredericks 2005), beliefs elictations

2 The model

Let b be the gains from crime and $s$is the sanction. Let w be the level of wealth at the time of the decision to commit the crime. Let ε_1 be the probability of type-I error (the prob. that the individual abstains from committing the crime and he is wrongfully sanctioned) and ε_2 be the probability of type-II error (the prob. that the individual commits the crime and he is not sanctioned). The individual decides whether to commit the crime or abstain based on the following two payoffs.

2.1 The Risk neutral case: monetary sanctions without restitution

We first consider the case where individuals are risk neutral and once they appropriate b they are only convicted and not forced to restitute b (

Each agent decides whether to stay honest or to commit the crime based on its own returns as follows:

$$\begin{cases} E\pi_i = w - \varepsilon_1(s+b) \\ E\pi_g = w - (1-\varepsilon_2)s + \varepsilon_2 b \end{cases} \tag{1}$$

Notice that restitution is in place so that once caught, the individual must return b to the victim and pay sanction s

The deterrence condition for Equation 1 is satisfied if $E\pi_i \geq E\pi_g$ and thus if $b < \frac{1-\varepsilon_1-\varepsilon_2}{\varepsilon_1-\varepsilon_2}s$. Again both errors have the same marginal negative impact on the level of b as $\frac{\partial b}{\partial \varepsilon_1} = \frac{\partial b}{\partial \varepsilon_2} = -s$. Both errors have the same negative impact on deterrence.

2.2 The Risk neutral case: monetary sanctions with restitution

Now let us consider the case where restitution is enforced in case of correct or wrongful conviction.

Each agent decides whether to stay honest or to commit the crime based on its own returns as follows:

$$\begin{cases} E\pi_i = w - \varepsilon_1 s \\ E\pi_g = w + b - (1-\varepsilon_2)s \end{cases} \tag{2}$$

The deterrence condition for Equation 2 is satisfied if $E\pi_i \geq E\pi_g$ and thus if $b < (1-\varepsilon_1-\varepsilon_2)\,s$. Notice that the two errors have the same marginal negative impact on the level of b as $\frac{\partial b}{\partial \varepsilon_1} = \frac{\partial b}{\partial \varepsilon_2} = -\frac{s}{(\varepsilon_1-\varepsilon_2)^2}$. Both errors have the same negative impact on deterrence.

2.3 Expected utility, monetary sanctions without restitution

Now let us consider individual with standard utility functions à-la von Newman Morgenstein. The utility of the action choices available (staying law-abiding or committing crime) are respectively the following:

$$\begin{cases} EU_i = (1-\varepsilon_1)U(w) + \varepsilon_1 U(w-s) \\ EU_g = \varepsilon_2 U(w+b) + (1-\varepsilon_2)U(w+b-s) \end{cases}$$

The deterrence condition for Equation 1 is satisfied if $EU_i \geq EU_g$ and thus if

$$\varepsilon_1 \left[U(w) - U(w-s)\right] + \varepsilon_2 \left[U(w+b) - U(w+b-s)\right] \geq U(w+b-s) - U(w-s) \quad (3)$$

which implicitly defines the crime triggers $\tilde{b}_{eu}$ once we impose $EU_i = EU_g$. Equation 3 shows that both ε_1 and ε_2 jeopardize deterrence as before. This is because when there is an increase in either of the errors on the left-hand side of the equation, individuals find crime convenient for lower levels of b (on the right-hand side). However, given the concavity of the utility function, the negative impact of wrongful convictions ε_1 on the crime trigger $\tilde{b}_{eu}$, and thus on social welfare is stronger than that of wrongful acquittals ε_2. To see why, note that $U(w) - U(w-s) > U(w+b) - U(w+b-s)$. In order to maintain the same level of deterrence, a given percentage increase of ε_1 must be compensated by a smaller percentage decrease of ε_2.

2.4 Expected utility, monetary sanctions with restitution

Now let us consider restitution. The utility of the action choices available (staying law-abiding or committing crime) are respectively the following:

$$\begin{cases} EU_i = (1-\varepsilon_1)U(w) + \varepsilon_1 U(w-b-s) \\ EU_g = \varepsilon_2 U(w+b) + (1-\varepsilon_2)U(w-s) \end{cases}$$

The deterrence condition for Equation 1 is satisfied if $EU_i \geq EU_g$ and thus if

$$\varepsilon_1 \left[U(w) - U(w-b-s)\right] + \varepsilon_2 \left[U(w+b) - U(w-s)\right] \geq U(w) - U(w-s) \quad (4)$$

As before, notice that given the concavity of the utility function, the negative impact of wrongful convictions ε_1 on the crime trigger $\tilde{b}_{eu}$, and thus on social

welfare is stronger than that of wrongful acquittals ε_2. To see why, note that $U(w) - U(w-b-s) > U(w+b) - U(w-s)$. In order to maintain the same level of deterrence, a given percentage increase of ε_1 must be compensated by a smaller percentage decrease of ε_2.

2.5 Expected utility, non-monetary gains from crime without restitution

When the sanction does not have a monetary nature, the results are very similar to those under risk neutrality once we assume separability in the arguments (monetary vs. non-monetary payoffs). The utility of the action choices available (staying law-abiding or committing crime) are respectively the following:

$$\begin{cases} EU_i = (1-\varepsilon_1)U(w) + \varepsilon_1 \left[U(w) - s\right] \\ EU_g = \varepsilon_2 U(w+b) + (1-\varepsilon_2)\left[U(w+b) - s\right] \end{cases}$$

The deterrence condition imposes that $EU_i \geq EU_g$. This produces a definition of the crime trigger as follows:

$$U(w+b) - U(w) < (1-\varepsilon_1-\varepsilon_2)s \tag{5}$$

The individual will commit the crime as long as his non-monetary gain from crime is higher than the net disutility of the sanction discounted by both judicial errors. As for the case of monetary payoffs and risk-neutrality, any change in either wrongful convictions ε_1 or wrongful acquittals ε_2 has the same symmetric impact on deterrence because any marginal change in either ε_1 or ε_2 determines an equal decrease of $\tilde{b}$.

2.6 Expected utility, non-monetary gains from crime with restitution

Now let us consider the case where the convicted defendant must restitute b to the victim. In this case the utility of the action choices available (staying law-abiding or committing crime) are respectively the following:

$$\begin{cases} EU_i = (1-\varepsilon_1)U(w) + \varepsilon_1 \left[U(w-b) - s\right] \\ EU_g = \varepsilon_2 U(w+b) + (1-\varepsilon_2)\left[U(w) - s\right] \end{cases}$$

The deterrence condition imposes that $EU_i \geq EU_g$. This produces a definition of the crime trigger as follows:

$$\varepsilon_1 \left[U(w) - U(w-b) + s\right] + \varepsilon_2 \left[U(w+b) - U(w) + s\right] < s \tag{6}$$

Now the $\varepsilon_1$has a larger impact on deterrence then to ε_2. This is because $U(w) - U(w-b) > U(w+b) - U(w)$

3 Experimental Design

- In order for the subjects to gain their endowment we use the slider task based on Gill and Prowse (2012). Every subject must fulfill 196 sliders in order to gain 7€
- The baseline game is an inverse dictator game where subjects can either decide to take nothing or to take any amount between 0 and 5€ from the other subject they are matched with.
- The experiment follows a within subject design al all subjects are exposed to the three treatments with the parameters in the table below. The first treatment is always the no error treatment while the second and third treatments have different type-I-to-type-II errors balance. Tey are submitted in random order to the subjects

Table 1: Experimental design: comparison of treatments

T0	T1	T2	
ε_1	0	0.5	0.10
ε_2	0	0.10	0.5
w	7€	7€	7€
$E\pi_A^I$	7€	7€	7€
$E\pi_A^C$	7€+5€	7€+5€	7€+5€
EU_A^I	$U(7)$	$U(7) - \frac{1}{2}s$	$U(7) - \frac{1}{10}s$
EU_A^C	$U(13)$	$U(13) - \frac{9}{10}s$	$U(13) - \frac{1}{2}s$
ΔEU_A	$U(13) - U(7)$	$U(13) - U(7) - \frac{2}{5}s$	$U(13) - U(7) - \frac{2}{5}s$

Note. ε_1 = probability of type-I error, ε_2 = probability of type-II error, w_A = endowment of subject A, $E\pi_A^I$ = A's expected payoff if innocent, $E\pi_A^C$ = A's expected payoff if criminal, EU_A^I = A's expected utility if innocent, EU_A^C = A's expected utility if criminal, ΔEU_A = Net expected utility gain from committing the crime.

4 Preliminary results

We run the first sessions with non-monetary sanctions on April 23. Summary statistics are as in the graph below

Number of observations: 77

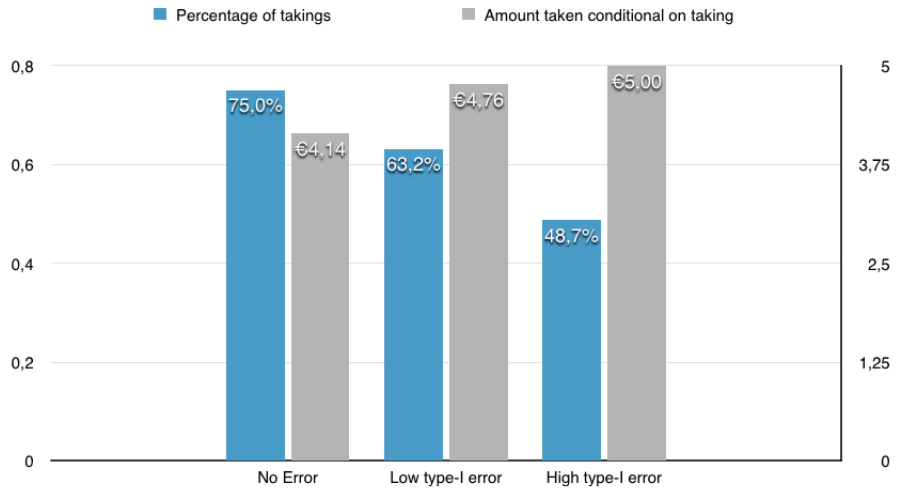

Figure 1: First preliminary results

5 Conclusions

To be added

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