Optimal Legal Standards for Competition Policy Revisited

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Abstract

I extend the model of legal standards in Katsoulacos and Ulph (2009) to allow for optimal statistical decision-making by the regulator. I show that an effects-based standard produces weakly lower decision error costs than a per se standard in this setting. I also use the framework to highlight an important implicit assumption underlying the comparison of legal standards in the cited paper.

JEL classification: K2, L4

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1 Introduction

Legal standards define the decision rule according to which a competition authority convicts or acquits potentially anti-competitive business practices such as bundling, resale price maintenance and other agreements between firms. In broad terms a distinction may be drawn between effects-based and per se legal standards. Under an effects-based standard, an investigation is conducted and a decision is made based on the likely economic harm suffered by consumers in any particular case. Under a per se standard, an entire class of actions is

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banned or permitted without attempting to identify individual occurrences of that action that might merit exception from the rule.

In an important contribution, Katsoulacos and Ulph (2009), hereafter KU, develop a general welfare-based model for the comparison of per se and effects-based legal standards. This welfare comparison accounts for both the direct effects of the authority's imperfect decision-making, as reflected in the cost of decision errors committed by the authority when it incorrectly convicts a benign action (a type I error) or incorrectly acquits a harmful one (a type II error), as well as the indirect deterrence effects that result from the chosen legal standard and the imposition of antitrust fines.

This paper extends the model of KU by providing a micro-foundation for the inferences the authority makes under an effects-based legal standard. This approach also nests KU's original reduced-form analysis as a special case. Our main result demonstrates that, when the authority incorporates all available information into an optimal statistical decision-making process, a per se standard cannot produce lower decision error costs than effects-based.

Importantly, this contrasts with KU's result that a per se standard might, in some circumstances, produce lower decision error costs. By relating the two models in detail, we show that this divergence in results follows from the assumption, implicit in KU's reduced-form approach, that the authority does not incorporate available prior information into its decision-making process under an effects-based standard.[1] In KU, the authority does not in fact decide on the basis of expected harm (economic effects) under an effects-based legal standard. It is this departure from standard informational updating that leads to the possibility of a per se standard generating lower decision error costs in KU.

Our results therefore clarify significantly the theoretical basis for choosing legal standards. This matters in policy terms given the continuing debate around the appropriate choice of legal standard for competition policy, as seen in context of the European proceedings against Intel's use of loyalty rebates,

[1] As argued below, this prior information reflects the legal presumption applicable to a given class of action that should, in practice as well as theory, form an important basis for the authority's decision-making.

for example (De Coninck, 2018).

The paper is organized as follows. Section 2 describes the economic setting. Section 3 presents our main result. Section 4 relates our analysis to KU. Section 5 concludes.

2 The Economic Setting

The basic economic setting parallels KU. Consider a population of firms of normalized size 1, each of which might undertake a particular type of action (e.g. bundling). Suppose that taking this action causes consumer harm of magnitude $h_H > 0$ for a fraction γ of firms in the population, $0 < \gamma < 1$, while the remaining $1 - \gamma$ firms cause harm $h_B < 0$ (that is, a consumer *benefit*). Any given firm's type h_H or h_B is its own private information, although the parameters γ, h_H and h_B are common knowledge.

2.1 Legal Standards

If the authority implements a per se illegality (per se legality) standard, it convicts (acquits) all firms taking the action, irrespective of their true type h_H or h_B. The appropriate per se rule is therefore determined with reference to the average harmfulness of this class of action, which is common knowledge by the above assumptions and defined as

$$\overline{h} = \gamma h_H + (1 - \gamma) h_B. \tag{1}$$

Per se legality is appropriate when $\overline{h} < 0$, per se illegality when $\overline{h} > 0$.

We elaborate on KU in our modelling of the authority's inferences under an effects-based legal standard.[2] Suppose that, under an effects-based standard, the authority conducts an investigation following the occurrence of an action within this class, which yields an imperfect statistical signal of its harmfulness. Let $\sigma \in \{\sigma_H, \sigma_B\}$ denote this signal, where σ_H and σ_B correspond to the indication that the firm under investigation is of type h_H or h_B, respectively. We

[2]Section 4 describes the relationship between our approach and KU in detail.

capture the accuracy of these signals in the following conditional probabilities:

$$\begin{aligned}
&\Pr\left(\sigma = \sigma_H | h_H\right) = p_{\sigma_H|h_H}, \\
&\Pr\left(\sigma = \sigma_B | h_H\right) = p_{\sigma_B|h_H} = 1 - p_{\sigma_H|h_H}, \\
&\Pr\left(\sigma = \sigma_H | h_B\right) = p_{\sigma_H|h_B}, \\
&\Pr\left(\sigma = \sigma_B | h_B\right) = p_{\sigma_B|h_B} = 1 - p_{\sigma_H|h_B},
\end{aligned}$$

and assume that signals are *informative* in the standard sense that $p_{\sigma_H|h_H} > p_{\sigma_H|h_B}$ (equivalently, $p_{\sigma_B|h_B} > p_{\sigma_B|h_H}$).

Under the effects-based standard, the authority convicts whenever the expected harm associated with the firm's conduct is positive. Letting $\widetilde{h}_\sigma$ denote expected harm, conditional on the authority receiving signal $\sigma \in \{\sigma_H, \sigma_B\}$, the authority will therefore convict whenever $\widetilde{h}_\sigma > 0$.

This expected harm is calculated as

$$\widetilde{h}_\sigma = p_{h_H|\sigma} \cdot h_H + p_{h_B|\sigma} \cdot h_B, \tag{2}$$

where

$$p_{h_H|\sigma} = \frac{p_{\sigma|h_H} \cdot \gamma}{p_{\sigma|h_H} \cdot \gamma + p_{\sigma|h_B} \cdot (1-\gamma)} \tag{3}$$

and

$$p_{h_B|\sigma} = \frac{p_{\sigma|h_B} \cdot (1-\gamma)}{p_{\sigma|h_H} \cdot \gamma + p_{\sigma|h_B} \cdot (1-\gamma)} \tag{4}$$

denote the updated (posterior) probabilities of the action being harmful or benign, respectively.

In this context the common knowledge parameters γ, h_H and h_B capture the authority's prior information that, in the course of an effects-based investigation, is updated using the signal σ (see above). This prior information has a strong policy interpretation in this context insofar as it describes the *legal presumption* characterizing this class of action. The legal presumption reflects the authority's acquired experience and available economic analysis describing how harmful or benign this action is likely to be, on average, and consequently represents an important basis for the authority's verdict in any given case (Ritter, 2018).

3 Decision Error Cost Comparison

In order to compare legal standards in terms of their propensity to commit decision errors, consider, as in KU, the decisions that would be reached with respect to a firm picked at random from the underlying population. Suppose that the action is presumptively illegal, $\overline{h} > 0$.[3]

Under a per se illegality standard, the authority bans every action. It therefore convicts incorrectly whenever the firm is of type h_B, leading to decision error costs

$$C^{PSI} = (1-\gamma)(-h_B). \tag{5}$$

Under an effects-based standard, the authority convicts if and only if the expected harm in (2) is positive. It is straightforward to show, using (3), (4) and the informative signals assumption, that the posterior probabilities satisfy

$$p_{h_H|\sigma_H} > \gamma, \quad p_{h_B|\sigma_H} < 1-\gamma, \quad p_{h_H|\sigma_B} < \gamma, \quad p_{h_B|\sigma_B} > 1-\gamma. \tag{6}$$

Given $\overline{h} > 0$, it follows that the authority is certain to convict, conditional on receiving signal σ_H: (2) then places more (less) weight on positive h_H (negative h_B) than does (1), implying $\widetilde{h}_{\sigma_H} > 0$.

The verdict that would be reached, conditional on receiving signal σ_B, is not certain. If the presumption of illegality is sufficiently strong ($\overline{h} \gg 0$), the authority will convict despite the lower (higher) posterior probability of the action being harmful (benign). If, however, this class of action is sufficiently close to the boundary of presumptively illegality ($\overline{h} \approx 0$), receiving σ_B causes the expected harm in (2) to turn negative, leading the authority to acquit in line with its signal. We consider each case in turn.[4]

Case (i): $\widetilde{h}_{\sigma_B} > 0$. In this case, the authority will convict all actions. Decisions are identical to those that would be reached under per se illegality, and the effects-based standard generates identical decision errors:

$$C^{EB} = (1-\gamma)(-h_B).$$

[3]The proof for $\overline{h} < 0$ follows symmetrically and is available on request from the author.

[4]It is straightforward to show that, in the knife-edge case where $\widetilde{h}_{\sigma_B} = 0$, the authority's decision upon receiving σ_B does not affect decision errors, and the result parallels case *(i)*.

Case (ii): $\widetilde{h}_{\sigma_B} < 0$. In this case the authority will acquit whenever it receives signal σ_B. Given that it convicts upon receiving signal σ_H (see above), decision error costs in this case are equal to

$$C^{EB} = \underbrace{(1-\gamma)\cdot(-h_B)\cdot p_{\sigma_H|h_B}}_{\text{Cost of type I errors}} + \underbrace{\gamma\cdot h_H\cdot p_{\sigma_B|h_H}}_{\text{Cost of type II errors}}.$$

With probability $p_{\sigma_H|h_B}$ the authority receives a harmful signal, despite the firm being of type h_B, leading to a type I (conviction) error. With probability $p_{\sigma_B|h_H}$ the authority receives a benign signal, despite the firm being of type h_H, leading to a type II (acquittal) error.

The difference in decision error costs between the effects-based and per se illegality standards may in this case be expressed as

$$C^{EB} - C^{PSI} = \gamma\cdot h_H\cdot p_{\sigma_B|h_H} + (1-\gamma)\cdot h_B\cdot p_{\sigma_B|h_B}.$$

Dividing by $\gamma\cdot p_{\sigma_B|h_H} + (1-\gamma)\cdot p_{\sigma_B|h_B}$ and using (3) and (4), we therefore have that effects-based produces weakly higher decision error costs whenever

$$p_{h_H|\sigma_B}\cdot h_H + p_{h_B|\sigma_B}\cdot h_B = \widetilde{h}_{\sigma_B} \geq 0, \tag{7}$$

which is contradicted by the premise of this case. Hence effects-based produces strictly lower decision error costs.

Summarising both cases, we have:

Proposition 1. *An effects-based legal standard produces weakly lower decision error costs than per se.*

Intuitively, the only case in which decisions under the effects-based standard depart from those under per se illegality is that in which the average harmfulness of actions generating signal σ_B differs from the average harm of this class of actions as a whole ($\widetilde{h}_{\sigma_B} < 0$ despite $\overline{h} > 0$). In that case, per se illegality *falsely* convicts the sub-population of firms generating σ_B, which implies strictly higher decision error costs than effects-based.

4 Discussion

We now discuss the relationship between this result and KU. In contrast to our approach, KU do not model the authority's inferences under an effects-based standard explicitly. Instead, they define exogenous reduced-form parameters, call them π_H and π_B, that reflect the probability with which a firm will be correctly identified under investigation, conditional on its type being h_H or h_B, respectively.

In a significant departure from our results, KU conclude that, when $\overline{h} > 0$, per se illegality produces *lower* decision error costs than effects-based whenever[5]

$$\frac{\pi_B}{1-\pi_H} < \frac{\gamma h_H}{(1-\gamma)(-h_B)}. \tag{8}$$

Our approach provides a micro-foundation for the accuracy parameters π_H and π_B. In our model, the probability that the authority will correctly identify a harmful action as part of its investigation can, for example, be expressed as[6]

$$\pi_H = p_{\sigma_H|h_H} \cdot \mathbf{1}_{\widetilde{h}_{\sigma_H}>0} + p_{\sigma_B|h_H} \cdot \mathbf{1}_{\widetilde{h}_{\sigma_B}>0}, \tag{9}$$

where $\mathbf{1}$ is the indicator function that takes a value of 1 if the condition in the subscript holds and 0 otherwise. Intuitively, a harmful action generates signal σ_H or σ_B with probability $p_{\sigma_H|h_H}$ and $p_{\sigma_B|h_H}$, respectively. Thereafter, the authority (correctly) convicts whenever the expected harm, which according to (2) depends on the signal, γ, h_H and h_B, is positive.

It follows that we cannot evaluate decision error costs on the basis of (8) in this context.[7] According to (9), the inequality in (8) contains endogenous variables in the sense that π_H and π_B are themselves functions of the right-hand-side common knowledge parameters γ, h_H and h_B.

The only context in which π_H (likewise, π_B) is independent of the prior information is, given (9), that in which the authority does not base its decision on expected harm (economic effects) at all, but rather decides in line with its

[5] See KU for the related condition when $\overline{h} < 0$.

[6] Similarly, $p_B = p_{\sigma_H|h_B} \cdot (1 - \mathbf{1}_{\widetilde{h}_{\sigma_H}>0}) + p_{\sigma_B|h_B} \cdot (1 - \mathbf{1}_{\widetilde{h}_{\sigma_B}>0})$.

[7] Instead, we must consider separately cases *(i)* and *(ii)* discussed in Section 3.

signal, irrespective of the strength of the legal presumption. In this case our model collapses to KU with $\pi_H = p_{\sigma_H|h_H}$ and $\pi_B = p_{\sigma_B|h_B}$.[8]

Our framework therefore highlights an important implicit assumption underlying the comparison of legal standards in KU. In essence, KU force the authority to decide in line with its signal, even when its informational value is dominated by the strength of the legal presumption. It is this implicit departure from optimal statistical decision-making under the effects-based standard that explains why a per se approach might, in contrast to our results, generate lower decision error costs in KU.

5 Conclusion

This paper extends KU's model of legal standards to allow for optimal decision-making by the regulator. We show that an effects-based legal standard produces weakly lower decision error costs than per se, and use our framework to highlight the important implicit assumption underlying KU's result in favour of per se standards.

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[8] It is worth noting that KU (p.426) state that decisions under an effects-based standard should be based on expected harm, even though this is not reflected in their model.

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