

Choice of Legal Standards Under Legal Uncertainty When Penalties are Optimally Set¹

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Abstract:

We examine⁴ the optimal choice of legal standards by a competition authority when the penalties it can impose are also set optimally. This extends two of our previous pieces of work. The first examines optimal legal standards for competition policy⁵ when penalties are fixed and there is no legal uncertainty. The second⁶ examines the implications for *effects-based* legal standards of various types of legal uncertainty, but where, once again penalties are exogenous.

Legal experts have argued that (i) *effects-based* standards entail greater legal uncertainty than *Per Se*, and this is a factor favouring the latter legal standard; (ii) the greater the degree of legal uncertainty the lower should be fines.

We find that if *effects-based* procedures entail lower costs of decision errors than *Per Se* then there is a clear welfare ranking of decision environments when fines are optimally set: an *effects-based* procedure with some degree of (or, partial) legal uncertainty dominates that with no legal uncertainty which in turn dominates that with (what we call) complete legal uncertainty which in turn dominates *Per Se*. Thus a *Per Se* procedure is never optimal. Further, we find that increased Legal Uncertainty could be associated with *higher* optimal fines.

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⁵ Katsoulacos & Ulph, *Journal of Industrial Economics*, 2009.

⁶ Katsoulacos & Ulph (2010a)

1. Introduction

An important issue when considering what type of enforcement procedure to use in situations in which regulatory intervention in markets is deemed necessary is that of Legal Certainty⁷. Certain enforcement or decision procedures are thought of in policy circles, as being superior, *ceteris paribus*, because their “cost” in terms, or as a result, of the legal uncertainty⁸ generated when these procedures are adopted is relatively low. This issue is important for a broad range of regulatory interventions⁹ which are induced by the following set of circumstances: (a) agents are taking actions that are privately beneficial but from a wider social viewpoint may be harmful or beneficial (b) the degree of social harm/benefit varies with the circumstances under which the action is taken (c) the authority/regulator *cannot observe the precise circumstances* under which any given action is taken.

The context of many of the discussions on legal uncertainty usually involves comparisons of *Effects-Based* (or what alternatively can be termed *discriminating*) and *Per Se* decision rules or enforcement procedures¹⁰. The idea is that under *Per Se* rules either *all* actions are allowed or *all* are disallowed, depending on whether their *average* harm is negative or positive, whereas under *Effects-Based* procedures, the Authority will allow some actions and disallow some other actions. When agents make the decision as to whether or not to undertake the action they have to consider the possibility that it might come under scrutiny by the Authority. Consequently, it is argued, under a *Per Se* rule they are certain how the action will be treated, whereas, under an *Effects-Based*

⁷ Legal scholars and social scientists have, of course, discussed the issue in a much wider context. Among early prominent authors, Max Weber, thought of legal certainty as necessary for capitalist progress – see discussion in Amato (1983) with extensive references to legal scholars including Posner’s (1977). In the more specific context with which we are concerned here, Forrester (2000) notes that “Legal certainty..... is very frequently invoked as a prime concern for those responsible for enforcing the competition rules. Advocates General, article writers and the Commission itself have each stated on various occasions how important it was to ensure legal certainty”. In the context of network industry regulation, see de Hauteclouque (2008).

⁸ Lack of ability to predict the outcome of a legal dispute. Amato (1983) defines “legal uncertainty” as a “situation that obtains when the (legal) rule that is relevant to a given act or transaction is said by informed attorneys to have an expected official outcome at or near the 0.5 level of predictability”.

⁹ These include interventions associated with the application of Competition Policy, Sectoral Regulation, Environmental Policy, Tax Compliance mechanisms etc.

¹⁰ Under a *Per Se* procedure an Authority allows or disallows an entire class of actions without trying to identify more carefully sub-classes of actions that might generally be harmful or generally benign. A *discriminating* legal standard or *Effects-Based* approach requires the Authority to establish explicit criteria for deeming some actions to be harmful and others benign and to then investigate each case to see which of these criteria it meets. An extreme form of the *Effects-Based* approach is what in US is termed *Rule – of – Reason* under which competition authorities have the discretion to apply different economic methodologies and criteria on a *case-by-case* basis.

approach, they do not know for sure what decision would be taken by the Authority. This Legal Uncertainty (LU) induced by *effects* –based procedures is harmful and, it is argued, should lead the Authority to favour *Per Se* procedures. The issue has gained in importance recently as Competition Authorities (CAs) at both national and EU level have adopted many significant reforms in decision and enforcement procedures, increasing reliance on economics-based methodologies and consequent use of an *Effects-Based* rather than a *Per Se* approach to deciding cases.

However, arguments about the implications of LU for the choice of enforcement procedures have typically been asserted rather than demonstrated and have not been subjected to rigorous scrutiny. While the issue of legal uncertainty has been widely alluded to and considered of fundamental importance among those involved in the design and implementation of public policy and, especially among legal experts, the concept was never formalised and the “cost of legal uncertainty” was never analysed using economic theory¹¹ until very recently. In Katsoulacos and Ulph (K&U, 2010a) we adapted the framework of K&U (2009) and used it to subject these ideas to rigorous analysis¹². Our analysis shows that whether legal uncertainty emerges under an *Effects-Based* procedure, its nature and extent, the implications for firm behaviour and the consequent choice of legal standard, depends crucially on:

- the information available to the Authority concerning the characteristics of firms and their environment that determine the harm/benefit generated by their actions,
- the information available to the firms about these characteristics and about the assessment criteria/tests and models used by the Authority,
- The costs that the firms will have to incur in order to “reduce” Legal Uncertainty
- The procedural uncertainty that the firms might also face – in terms of incomplete coverage by the CA of the actions that should be investigated and delays in reaching decision under some decision rules.

A number of interesting points and results emerged from our analysis:

¹¹ Indeed there are no formal or comprehensive discussions concerning exactly *how* “legal uncertainty” generates *social welfare costs* though issues relating to risk-adversity, potentially adverse deterrence effects, costs to firms for obtaining and analyzing information to reduce uncertainty and the fact that penalties are less easy to justify if an action is condemned, are recognized as important considerations. As will become clear below, the emphasis in this paper is on deterrence effects and in an extension we allow firms to reduce uncertainty by incurring some costs.

¹² For a brief review of these articles see also K&U (2010 b).

- (i) *Effects-based* procedures generate *variability* of treatment (different decisions are taken in different cases) but not necessarily *uncertainty* of treatment (firms not knowing how their case will be treated). There are cases where with *effects-based* there will be no LU and then provided the *effects-based* rule reduces decision errors then welfare under an *effects-based* rule is higher than under a *Per Se* rule. So not only is *Per Se* not the only way of achieving legal certainty, it is not necessarily the best way of achieving it.
- (ii) . When *Effects-based* procedures generate Legal uncertainty then they may still be superior to *Per Se* because of the superior deterrence effects that the uncertainty generates. So *legal uncertainty can be welfare-enhancing*. The intuition is that uncertainty increases deterrence but also produces a *differential deterrence effect*: the increase in the deterrence of harmful actions is greater than that of benign actions. If this effect is strong enough *effects-based* with Legal Uncertainty is superior to *Per Se*.
- (iii) Allowing firms to reduce legal uncertainty by incurring some costs does not alter the qualitative nature of the welfare comparisons between procedures with and procedures with no Legal Uncertainty as stated above.
- (iv) Procedural uncertainty due to incomplete coverage and decision-making delays has some rather subtle implications for deterrence and may actually *increase* the attractiveness of procedures in which there is Legal Uncertainty.

In the present paper we have three main objectives:

- (a) To improve and further clarify the analytical framework for the examination of legal uncertainty contained in K&U (2010a) – section 2 below.
- (b) To extend the analysis on optimal enforcement procedures under legal uncertainty by endogenising the fines set by the Competition Authority (CA). We examine the optimal level of fines – that would maximise social welfare – under *Per Se* and under *effects-based* procedures, in the latter case under various scenaria concerning the information available to the firms. Fines are proportional to the

expected profits of a potentially anti-competitive action¹³. For each specific procedure fines are set so as to produce the deterrence of actions under that procedure that will maximise social welfare – Sections 3 and 4 below.

- (c) To extend the analysis of optimal procedures with legal uncertainty and endogenous fines to the case where firms can appeal against the CA decisions. A first analysis of this case without legal uncertainty and exogenous fines appears in K&U (2011). In the present version of the paper we omit the analysis with appeals as it is still very much work under progress.

The following results are obtained below:

- (i) When fines are set optimally *effects-based* procedures with some legal uncertainty are unambiguously *better* than *effects-based* procedure with no legal uncertainty *and may* entail a *higher* penalty.
- (ii) When fines are set optimally, provided *effects-based* procedures reduce decision errors, they are certainly no worse and will usually dominate *Per Se*. So a *Per Se* rule is never better than an *effects-based* rule¹⁴.
- (iii) In contrast to what sometimes legal experts have argued - that under “*greater degrees of legal uncertainty fines should be lower*”- it is shown that procedures with legal uncertainty, as *effects-based* procedures, can be associated with *higher* optimal fines than optimal fines under *Per Se* procedures.

1. Basic Set up – Modelling Legal Uncertainty

Preliminaries

There is a population of firms of size 1 that could take a particular type of action. A fraction γ , $0 < \gamma < 1$ come from a Harmful environment so, if they take the action and it is not stopped, this generates harm that we denote by $h_H > 0$. The remaining fraction

¹³ It is shown that optimality can be achieved by using only proportional fines – i.e. does not require fines a part of which relates to the expected harm of the action.

¹⁴ At least when, as assumed here, Legal Uncertainty emerges, under *effects-based*, just due to the firms not knowing how exactly the CA would reach its decision in their case – that is, uncertainty under (b) mentioned above.

come from a Benign environment, so, if they take the action, this generates harm that we denote by $h_b < 0$. Let \bar{h} be the average harm for this type of action. The type of action is said to be *Presumptively Legal* (resp. *Illegal*) if $\bar{h} < 0$ (resp. $\bar{h} > 0$). We assume that γ and \bar{h} are common knowledge.

In the absence of any intervention by the Competition Authority, taking an action will confer a private benefit $b > 0$ for the firm¹⁵. The distribution of b is independent of the environment from which the firm comes¹⁶. We suppose that the private benefit has a positive continuous probability density $f(b) > 0$ on $[0,1)$, with cumulative distribution function given by $F(b)$, $0 < F(b) < 1$; $F'(b) > 0$.

Competition Authority Decision Procedures

There is a Competition Authority (hereafter CA) which investigates a fraction π (the coverage rate) of the actions taken and we assume that δ is the delay by the Authority in making decisions¹⁷. The CA can use one of two decision procedures.

Per Se Here it allows all actions if they are *Presumptively Legal* and disallows all actions if they are *Presumptively Illegal*. Note that the fundamental characteristics of *Per Se* rules are that each action is treated in the same way – they are either all allowed or all disallowed - and that only one type of error is made by the CA – Type I for presumptively illegal and Type II for Presumptively Legal actions.

Effects-Based Under this procedure the CA undertakes an investigation of each action detected¹⁸ as a result of which it gets an estimate or a signal of the likely harm caused by the action. This signal, which is only imperfectly correlated with the true harm will be either a “Positive Harm” - indicating that the action is likely to reduce welfare - or

¹⁵ Which we take to be the present value of the expected change in profits from the action over its ‘natural’ lifetime.

¹⁶ The “symmetry” assumption - see K&U 2009, in which we also discuss the implications of relaxing this assumption.

¹⁷ We abstract from differences in the delay in decisions across *effects-based* and *Per Se* enforcement procedures (see K&U, 2009).

¹⁸ See below for the coverage rate.

a “Negative Harm” - indicating that the action is likely to increase welfare – signal. The probability that a Benign action generates a Negative Harm signal is p_B , $0 < p_B < 1$; the probability that a Harmful action generates a Positive Harm signal is p_H , $0 < p_H < 1$. We assume that the underlying “model” used by the CA in its investigation to generate the signal has some *discriminatory power* so that $p_B + p_H > 1$ so firms from the Harmful environment are more likely to generate a Positive Harm signal than are firms from the Benign environment, and, correspondingly, firms from the Benign environment are more likely to generate a Negative Harm signal than are firms from the Harmful environment. p_B, p_H capture the “quality” of the CA’s effects – based procedure.

The decision rule used by the CA is to allow all actions that give a Negative signal (negative harm estimate) and disallow those that give a Positive signal (positive harm estimate). So under Effects-Based a different decision will be reached for different actions investigated and there will be both types of errors made. A firm that has its action disallowed has to pay a penalty. Below we will specify in more detail how this penalty will be determined.

To ensure that the *Effects-Based* procedure is not a “straw man” and is a potentially sensible decision rule to use given the estimates generated by the CA’s investigation, we make the following assumption about the discriminatory power of the CA’s model.

ASSUMPTION 1 The *Effects-Based* Rule produces lower *Costs of Decision Errors*¹⁹.

In the terminology we used in Katsoulacos & Ulph (2009) we are assuming that the *effects-based* procedures can *effectively discriminate*.

¹⁹ For the exact conditions that must hold for this to be true see K&U (2009).

Behaviour of Firms

Firms have to decide whether or not to take the action, and obviously a factor that will be relevant to them in reaching this decision is the anticipated likely decision by the CA when it investigates the action. So behaviour varies depending on what decision procedure the CA uses.

If β , $0 \leq \beta \leq 1$ is the probability of having an action banned then a firm with private benefit b that anticipates that it have to pay a penalty f if its action is disallowed, will take the action if:

$$b[1 - \beta\pi(1 - \delta)] > \beta\pi f .$$

Let $F_e^r(b_e^r)$ be the fraction of firms from environment $e = H, B$ that are deterred from taking the action when procedure or rule r is used where b_e^r is the value of b for which above expression is satisfied as an equality.

Types of Legal Uncertainty

Now, when an *effects-based* approach is used and the CA decides whether or not to disallow an action on the basis of its estimate of harm, h^e , Legal Uncertainty may emerge because:

(a) the firms face uncertainty or incomplete information about the ultimate bases of making a judgement, i.e. what are the considerations taken into account (and how they are taken into account) for assessing harm²⁰ – the latter been (imperfectly) deduced from what is contained in Competition Law statutes (such as articles 101 and 102 EC), or because

(b) the firms face uncertainty about how decisions are taken by the Competition Authority, where these decisions rely on the assessment of certain indicators that characterize the firms, their products and market(s) and the actions undertaken, due to

²⁰ Such considerations include the extent to which production is reduced, the prices are raised, innovative activity is enhanced, conduct is discriminatory etc.

incomplete information of the model(s) or of the data that are used by the CA to make the assessment of the indicators and to reach these decisions (as described in the Guidelines produced by the CA).

To clarify these sources of legal uncertainty let x_k be a vector that specifies the values of a series of indicators pertaining to firm/action k that determine the effect of this action on a series of “outcomes” specified by vector y_k (prices, production, quality, variety, innovation etc) which in turn determine the true harm of the action h_k . That is:

$$x_k \longrightarrow y_k \longrightarrow h_k$$

We assume throughout that neither the firms nor the CA know x_k . However the CA will be able to measure in the course of the investigation of action k a series of indicators pertaining to firm/action k i.e. will obtain an estimate x_k^e that allows it to obtain an estimate of “outcomes” y_k^e and hence an estimate of harm h_k^e generated by the action.

That is through the investigation the CA obtains:

$$x_k^e \longrightarrow y_k^e \longrightarrow h_k^e$$

On the other hand, we assume that firms even though they cannot observe x_k they can observe y_k - e.g. though they cannot observe x_k they can determine the extent to which their prices will be affected by their action – and given this they may or may not (depending on the completeness and clarity of the statutes) be able to determine h_k , i.e. the true harm that their action will generate (in the latter case we say that the firms “know their type”). So firms may or may not have uncertainty of type (a) above.

Also, firms may face uncertainty of type (b) which means that they may be unable to observe y_k^e and hence h_k^e , that is, they may be unable to observe the estimate of harm that the CA will reach in their case and on the basis of which the CA will decide whether or not to allow their action. We distinguish two cases: in one of these cases firms can observe h_k^e which implies that firms know exactly how the CA will decide if they are investigated, independently of whether they also know their true h_k - indicated as No

Legal Uncertainty (NLU) in the Table below. In the other case firms cannot observe h_k^e . In this case, if a firm knows h_k (its true type) then one sub-case is that in which we assume that this and the firm's observations about how the CA has treated cases with similar characteristics to its own allow it to determine average p_B, p_H - indicated as Partial Legal Uncertainty (PLU) in the Table below. In the other sub-case firms do not know h_k so even this is not possible – indicated as Complete Legal Uncertainty (CLU) in the Table below. In this latter sub-case all that firms know is the average probability of having an action disallowed:

$$\bar{p} = \gamma p_H + (1-\gamma).(1-p_B).$$

TABLE

		Firms know: h_k	
		YES	NO
Firms know: h_k^e	YES	No Legal Uncertainty (NLU)	No Legal Uncertainty (NLU)
	NO	Partial Legal Uncertainty (PLU)	Complete Legal Uncertainty (CLU)

It is important to note that the situations PLU and CLU in the Table above are not ranked in terms of the degree of uncertainty – they just represent different assumptions about what firms know and do not know. Also, while below we will generally assume that each of these cases applies to *all* firms – i.e. all firms have either NLU or PLU or CLU – this assumption is neither necessary nor is it realistic. It is more realistic to expect that there will be a mixture of firms: some of which have NLU, some have PLU and some have CLU – for more on this see below.

We can think of NLU as a situation in which the CA specifies:

- The complete list of indicators in x on which it will collect information;
- the types of data and the techniques it will use to measure all these indicators;

- the rules $y_k^e = f(x_k^e)$ and $h_k^e = g(y_k^e)$ that it will use to combine all these indicators into a decision $d_k \in \{A, D\}$ - Allow or Disallow the action.

The assumption we make in NLU is that firms know both x_k^e as well as the rules $f(\cdot)$ and $g(\cdot)$ and so know d_k . Of course, until it conducts an investigation, the CA does not know x_k^e , and so does not know d_k .

In the following discussion we will assume for simplicity, as in K&U (2009), that all actions in the Harmful environment generate the same harm $h_H > 0$, and all actions that come from a Benign environment generate the same harm $h_B < 0$. Thus, $\bar{h} = \gamma h_H + (1 - \gamma) h_B$ is the average harm. We will also make the following assumption:

ASSUMPTION 2 Assume that the “quality” of the effects-based procedure, captured by p_B, p_H , is the same across the three different types of legal uncertainty.

2. Fines

As noted in the Introduction one of our main objectives here is to extend the analysis on optimal enforcement procedures under legal uncertainty by endogenising the fines set by the Competition Authority (CA). In general we can assume that the fine takes the form of a fixed penalty plus a proportional penalty²¹. These reflect the twin desires to link penalty to harm and to the private benefit firms obtain from acting badly. As we will see, in general the optimal penalty can always be obtained by using just a penalty proportional to private benefit.

The idea is this. Suppose the penalty takes the form $\psi + \phi b$, $\psi \geq 0, \phi \geq 0$. Then for a firm with private benefit b the net benefit from taking the action is

$$b \{ [1 - \beta\pi(1 - \delta)] - \beta\pi\phi \} - \beta\pi\psi . \quad (1)$$

²¹ There is an extensive literature on fines and law enforcement – see in particular the survey of Polinsky and Shavell (2000). For a treatment that addresses fines under antitrust law Buccirrorri and Spangolo (2006) and Wils (2006).

If $\varphi > \frac{1}{\beta\pi} - (1-\delta)$ then no firm will take the action whatever the value of ψ , so we might as well set $\psi = 0$.

If $\varphi < \frac{1}{\beta\pi} - (1-\delta)$ and $\psi=0$, then all firms will take the action, while if $\varphi < \frac{1}{\beta\pi} - (1-\delta)$ and $\psi > 0$ then the only firms that take the action are those with high values of private benefit. But it turns out that in all cases we either want all firms of a particular type to take the action or none of them to do so. So we can achieve the optimal fines by using ONLY proportional fines.

So then the critical value of φ below which a firm would definitely take the action and above which it would not is :

$$\varphi = \left(\frac{1}{\pi\beta} - 1 \right) + \delta . \quad (2)$$

There are a number of differences between this formulation and that appearing in typical treatments in the literature on law enforcement.

- (i) In contrast to the typical treatments in which the critical value depends on just the “probability of detection” where this is the same as the “probability of being disallowed” here the latter depends on the coverage rate (or probability of detection) AND the probability that the CA will, possibly following an investigation, find the action harmful and thus disallow, which depends on the enforcement procedure used. So the choice of enforcement procedure influences the optimal fine.
- (ii) In typical treatments there is no account for the influence on fines of delays in CA’s decision making ($\delta = 0$).
- (iii) In typical treatments it is assumed that firms get with certainty the benefit b from their actions while here we assume that the actions only create a benefit if it is not disallowed or, if it disallowed, just during the period of the investigation.

In all that follows we will assume that there is *procedural uncertainty* arising because not all firms are investigated - $\pi < 1$ - and there is a delay in taking decisions -

$\delta > 0$ - so that, even if actions will be banned for sure - $\beta = 1$ - a positive penalty will be needed if actions are to be deterred.

3. Optimal Choice of Enforcement Procedures under Legal Uncertainty when Fines are Set Optimally

Here we determine the optimal penalties and associated optimal enforcement procedures under different types of Legal Uncertainty. Throughout we will consider only *Effects-Based* decision rules for which the CA can *effectively discriminate*.

3.1 Effects Based: No Legal Uncertainty

Here, given the CA's *effects-based* model for estimating harm, a fraction p_B resp. $1 - p_H$ of firms from the benign (resp. harmful) environment know for sure that their action will be allowed. So, irrespective of the penalty, they will take the action. The remaining firms from the harmful (resp. benign) environment will know for sure that their action will be disallowed. Given our assumption that private benefit is uncorrelated with harm it follows that for *any* given penalty the same fraction $F, 0 \leq F \leq 1$ of these firms will be deterred. Consequently welfare under any given penalty regime is:

$$W = -\left\{ \gamma h_H (1 - p_H) + (1 - \gamma) h_B p_B \right\} + \left[1 - \pi(1 - \delta) \right] (1 - F) \left\{ \gamma h_H p_H - (1 - \gamma)(-h_B)(1 - p_B) \right\} \quad (3)$$

The first term on the RHS shows the welfare of the actions taken by firms that know that their actions will be allowed, while the second term on the RHS shows the welfare of actions taken by those firms that know that their actions will be disallowed if investigated but are not deterred given that the coverage rate is less than unity and there is a positive delay in decision making.

Now we know from K&U (2009) that if the CA's rule can *effectively discriminate* whether an action is *Presumptively Legal* or *Presumptively Illegal* then the first term in the curly brackets on the RHS of (3) is negative and in the second term of the RHS:

$$\gamma h_H p_H > (1 - \gamma)(-h_B)(1 - p_B). \quad (4)$$

Given these it follows that to maximise welfare we want to deter all the firms who know for sure that their action will be disallowed (thus reducing the second term on the RHS of (3) to zero), and, from (2) to do this we set the proportional penalty at the level $\left(\frac{1}{\pi}-1\right)+\delta$ ²². So we have:

Proposition 1

When there is *no legal uncertainty*

(i) the optimal penalty is $\varphi^0 = \left(\frac{1}{\pi}-1\right)+\delta$; (5)

(ii) the associated maximum level of welfare is $W^0 = -\{\gamma h_H(1-p_H) + (1-\gamma)h_B p_B\}$. (6)

3.2 Effects Based: Partial Legal Uncertainty

For any given penalty scheme fewer firms from the benign environment will be deterred than from the harmful environment. That is, if the fraction deterred from environment $e = H, B$ is F_e^p , $0 \leq F_e^p \leq 1$, then $F_H^p > F_B^p$ and so welfare under any penalty is:

$$W = (1-F_H^p)\gamma(-h_H)[1-\pi p_H(1-\delta)] + (1-F_B^p)(1-\gamma)(-h_B)[1-\pi(1-p_B)(1-\delta)] \quad (5)$$

In (5) the first term on the RHS is the harm of harmful actions undertaken as they are not deterred and are either not disallowed or are disallowed with some delay. The second term on the RHS is the harm from benign actions undertaken as they are not deterred and are either not disallowed or are disallowed with some delay. The optimum is clearly to set

$F_H^p = 1, F_B^p = 0$ and, from (2) we can do this by setting a penalty $\left(\frac{1}{\pi p_H}-1\right)+\delta$ since this

²² Given the probability of been disallowed if investigated is unity.

will deter all harmful actions while – since $p_H > 1 - p_B$ - none of the benign actions will be deterred. So we have:

Proposition 2

When there is *partial legal uncertainty* then

(i) the optimal penalty is $\varphi^p = \left(\frac{1}{\pi p_H} - 1 \right) + \delta$, and (7)

(ii) the associated maximum level of welfare is

$$W^p = (1 - \gamma)(-h_B) [1 - \pi(1 - p_B)(1 - \delta)] > 0. \tag{8}$$

3.3 Effects-Based: Complete Legal Uncertainty

When there is complete legal uncertainty then each firm sees the risk of having their action disallowed as just the average probability $\bar{p} = \gamma p_H + (1 - \gamma)p_B < p_H$, and, given our assumption of zero correlation between the harm and private benefit, under any penalty regime the same fraction of firms will be deterred from each of the two environments (say F^c). So welfare is just $W = (1 - F^c)W$ where:

$$W = \gamma(-h_H) [1 - \pi p_H (1 - \delta)] + (1 - \gamma)(-h_B) [1 - \pi(1 - p_B)(1 - \delta)] \tag{9}$$

Notice that if we let $x = \pi(1 - \delta)$, $0 \leq x \leq 1$ then we can think of W as being a function of x , and, moreover, it is strictly increasing function since

$$\frac{dW}{dx} = \gamma h_H p_H - (1 - \gamma)(-h_B)(1 - p_B) > 0 \tag{10}$$

where the inequality follows from (4).

Notice also that

$$W(0) = -\bar{h} \text{ and } W(1) = W^0 = (1-\gamma)(-h_B)p_B - \gamma h_H(1-p_H). \quad (11)$$

It follows from (11) and (10) that if an action is *Presumptively Legal* ($\bar{h} < 0$) then $W > 0 \quad \forall x, 0 \leq x \leq 1$.

On the other hand if an action is *Presumptively Illegal* ($\bar{h} > 0$) then clearly $W < 0$ if $\pi(1-\delta) \approx 0$ but, provided the CA's *Effects-Based* rule can *effectively discriminate* – which requires that $(1-\gamma)(-h_B)p_B - \gamma h_H(1-p_H) > 0$ - then $W > 0$ if $\pi(1-\delta) \approx 1$

So we have:

Proposition 3

If there is *complete legal uncertainty* then

(a) if $W > 0$ - for which a sufficient but not necessary condition is that the action is *Presumptively Legal* - then:

(i) the optimal penalty is $\varphi^c = 0$, and, (12)

(ii) the associated maximum level of welfare is $W^c = W > 0$; (13)

(b) if $W < 0$ - for which a necessary but not sufficient condition is that the action is *Presumptively Illegal* - then:

(i) the optimal penalty is $\varphi^c = \left[\frac{1}{\pi p} - 1 \right] + \delta$, and, (14)

(ii) the associated level of welfare is $W^c = 0$. (15)

3.4 Per Se

If the action is *Presumptively Legal* all firms will take the action whatever the penalty and the associated level of welfare is $-\bar{h} > 0$.

If the action is *Presumptively Illegal* under any penalty regime the same fraction of firms will be deterred from the harmful and benign environments given our assumption that b is not correlated to harm, and so welfare is just $W = -(1-F)\bar{h}$ and the optimal penalty is the same as with *no legal uncertainty* (since again the probability of being disallowed is unity).

Proposition 4

Under *Per Se*,

(a) if the action is *Presumptively Legal* then

(i) the optimum penalty is $\varphi^{PSL} = 0$, and (16)

(ii) the associated maximum level of welfare is $W^{PSL} = -\bar{h} > 0$; (17)

(b) if the action is *Presumptively Illegal* then

(i) the optimum penalty is $\varphi^{PSI} = \varphi^0 = \left[\frac{1}{\pi} - 1 \right] + \delta$, and (18)

(ii) the associated maximum level of welfare is $W^{PSI} = 0$. (19)

4. Comparisons

We can now turn to a comparison of the outcomes in terms of welfare and penalties.

4.1 *Effects-Based: Partial vs No Legal Uncertainty*

From (8), notice that W^p is strictly decreasing in $\pi(1-\delta)$ so, using (6)

$$\begin{aligned}
 W^p &> (1-\gamma)(-h_B)[1-(1-p_B)] = (1-\gamma)(-h_B)p_B > \\
 &-\left[\gamma h_H(1-p_H) + (1-\gamma)h_B p_B\right] = W^0
 \end{aligned}
 \tag{20}$$

Notice also that from (5) and (7) it is clear that

$$\varphi^p > \varphi^0. \quad (21)$$

Thus we have:

Proposition 5

If the CA sets the optimum penalty then *partial legal uncertainty* is unambiguously welfare superior to *no legal uncertainty* and entails a higher penalty.

The reason is straightforward, with *partial legal certainty* the CA can exploit its ability to discriminate (albeit imperfectly) between harmful and benign acts and set a penalty that deters ALL harmful acts. However when there is no legal uncertainty then, although it can deter firms from taking action when they know their actions will be disallowed, there will still be some harmful actions taken. It has to use a higher penalty to deter harmful actions because firms still only have a chance of having their acts disallowed.

This is a stronger result than in our earlier work (K&U, 2010a) where we could show that *partial legal certainty* welfare-dominated *no legal uncertainty* only in certain cases.

5.2 Effects-Based: No Legal Uncertainty vs Complete Legal Uncertainty

From (6), (10) and (11) we know that $W^0 = W(1) \geq W(x) \quad \forall x = \pi(1-\delta), 0 \leq x \leq 1$, while from (13) and (15) we know that $W^c = \text{MAX}[W, 0] \geq 0$. We also know that provided the CA's *Effects-Based* rule can *effectively discriminate* then it is certainly the case that $W(1) = W^0 > 0$. Taken together this implies that

$$W^0 = W(1) \geq W^c, \quad (22)$$

with equality iff $\pi(1-\delta) = 1 \Leftrightarrow \pi = 1$ and $\delta = 0$.

However from (5) (12) and (14) we see that:

$$\text{if } 0 < W^c < W^0 \text{ then } \varphi^c = 0 < \varphi^0 = \left[\frac{1}{\pi} - 1 \right] + \delta, \quad (23)$$

while

$$\text{if } W^c = 0 < W^0 \text{ then } \varphi^c = \left[\frac{1}{\pi p} - 1 \right] + \delta > \varphi^0 = \left[\frac{1}{\pi} - 1 \right] + \delta. \quad (24)$$

So we have:

Proposition 6

If the CA sets the optimum penalty then:

- (a) Welfare under *No Legal Uncertainty* is at least as great as that under *Complete Legal Uncertainty*.
- (b) Welfare under *No Legal Uncertainty* is identical to that under *Complete Legal Uncertainty* if and only if there is no procedural uncertainty – i.e. all cases are investigated and decisions reached without delay.
- (c) Optimal penalties under *No Legal Uncertainty* may be higher than those under *Complete Legal Uncertainty* – certainly the case if the action is *Presumptively Legal* – but may also be lower – which will be the case only if action is *Presumptively Illegal*.

5.3 Effects-Based with Complete Legal Uncertainty vs Per Se

If the action is *Presumptively Illegal* then from (13), (15) and (19) we see that

$$W^c = \text{MAX} [W, 0] \geq 0 = W^{PSI} \quad (23)$$

whereas

$$\varphi^c = \begin{cases} \left[\frac{1}{\pi p} - 1 \right] + \delta > \left[\frac{1}{\pi} - 1 \right] + \delta = \varphi^{PSI} & \text{as } W < 0 \\ 0 < \left[\frac{1}{\pi} - 1 \right] + \delta = \varphi^{PSI} & \text{as } W > 0 \end{cases} \quad (24)$$

On the other hand, if the action is *Presumptively Legal* then from (13) (19) and (9) we have:

$$\begin{aligned} W^c &= -\bar{h} + \pi(1-\delta) \left[p_H \gamma h_H - (1-p_B)(1-\gamma)(-h_B) \right] \\ &= W^{PSL} + \pi(1-\delta) \left[p_H \gamma h_H - (1-p_B)(1-\gamma)(-h_B) \right] \end{aligned} \quad (25)$$

and from (4) we know that the second term is positive as long as the CA's Rule can *effectively discriminate*.

In addition we know from (12) and (16) we know that

$$\varphi^c = \varphi^{PSL} = 0. \quad (26)$$

So we have

Proposition 7

(a) If an action is *Presumptively Illegal* then an *Effects-Based Rule with Complete Legal Uncertainty* is no worse and may sometimes be better than a *Per Se* Rule. In cases where it is welfare superior the optimal penalty is higher, otherwise the optimal penalty is lower – indeed zero.

(b) If an action is *Presumptively Legal* and if the CA's rule can *effectively discriminate* then an *Effects-Based Rule with Complete Legal Uncertainty* welfare dominates a *Per Se* Rule but requires exactly the same penalty – zero.

From Propositions 5, 6 and 7 we get:

Proposition 8

Provided the CA can *effectively discriminate* and provided it sets optimal penalties then there is a clear welfare ranking of decision environments: an *Effects-Based* rule with *Partial Legal Uncertainty* dominates that with *No Legal Uncertainty* which in turn dominates that with *Complete Legal Uncertainty* which in turn dominates a *Per Se* Rule.

Put differently a *Per Se* Rule is never better than an *Effects –Based* Rule - and is in many cases worse - however great the degree of *Legal Uncertainty*.

However while in many cases a higher welfare ranking is associated with the imposition of tougher penalties, this is not always the case.

A note: Are investigations necessary when fines are optimally set?

An obvious question that emerges from the above analysis, though with more general applicability, is the following. If the CA sets a fine level that deters all harmful actions while not deterring benign actions then what is the purpose of having a (costly) mechanism for investigating actions once they are taken?²³ Suppose an *effects-based* procedure is used and there is NLU. Then, by definition, every firm knows its x_k^e . If the CA knows that it is dealing with a situation of NLU then it knows that all firms know their x_k^e . Consequently if a firm has taken the action then even if the CA does not know before investigating the precise value of x_k^e for that firm it knows that it is such that, under its announced rule the value of x_k^e is such that it will indeed allow the action. So it does not need to investigate – it should allow the action. But the problem is that if it does this it is no longer using the rule that it decides whether to allow or disallow depending on the estimate of harm that is generated by the model $f(\cdot)$. Its decision rule would essentially be that “if a firm takes an action allow it”. But then all firms would know that this is the rule and then all actions will be taken – irrespective of the size of the fine - and from (3) this is certainly sub-optimal. In other words if the CA does not investigate then it is no longer using the model that generated the beliefs that led to the behaviour that it tries to manipulate through its penalty.

Alternatively, suppose that there is PLU. Then again if the CA sets the optimal penalty that ensures only benign firms take the action then there is no need to investigate.

²³ Here, as in K&U (2009) we abstract from the costs of carrying out investigations – which are discussed in the literature on optimal law enforcement and which of course are substantial in practice.

But if it does not investigate it basically allows every action that comes before it. But in this case its decision rule is once again – “allow every action that is taken” and this is characterised by $p_H = 0, p_B = 1$. But then if, under PLU firms know their type and know p_H and p_B then they will know $p_H = 0, p_B = 1$ and all firms will take the action and no penalty will stop them. Once again this is distinctly sub-optimal.

So there really is a point in investigating because it supports the rule that supports the beliefs that gives rise to the behaviour that it can manipulate through penalties.

In addition, in our analysis above, under PLU, the fine that deters benign actions is higher than the fine that deters harmful actions – since the probability of a benign action being disallowed is lower. So setting the latter fine is optimal as it deters all harmful and also does not deter any benign actions. However, there are simple extensions to the model capturing a number of realistic aspects, under which fines that minimise the deterrence of benign actions will not deter harmful actions so the CA will have to investigate. Some such extensions are:

1. If the benefit (b) to firms from the harmful environment from taking the action is much higher than the benefit to the firms from the benign environment from taking the action then setting a fine that does not deter benign actions may well not deter harmful actions.
2. If in the harmful environment there are, say, two types of harmful actions: “very harmful” (k) and “not so harmful” (k'). Assume that with the CA’s model $p_H^k > 1 - p_B \geq p_H^{k'}$ so the model can discriminate between benign and “very harmful” actions but not between benign and “not so harmful” actions. Then setting a fine that does not deter benign will also not deter the “not so harmful actions.

More to the point, in practice, CAs will be setting penalties having in mind a set of different kinds of actions (e.g. anticompetitive exclusive dealing agreements and anticompetitive bundling). Assume two different kinds of actions k and k' and that while $p_H^k > 1 - p_B^k$ and $p_H^{k'} > 1 - p_B^{k'}$ it is also true that $1 - p_B^k > p_H^{k'}$. Then again setting a fine that does not deter benign actions of type k will also not deter harmful actions of type k' .

5. *Concluding Remarks*

In this paper we examine the implications of endogenising antitrust penalties on the optimal choice of procedures or legal standards used by competition authorities thus extending our model on Optimal Legal Standards (JIE, 2009). Also, we extend our work on Legal Uncertainty (K&U, 2010a). Different enforcement procedures, such as *effects-based* and *Per Se* procedures generate different degrees of legal uncertainty and this also has to be factored in (legal experts arguing that under “*greater degrees of legal uncertainty fines should be lower*”).

We find that provided *effects-based* procedures can reduce decision errors, there is a clear welfare ranking of decision environments when fines are optimally set: an *effects-based* procedure with some degree of (or, partial) legal uncertainty dominates that with no legal uncertainty which in turn dominates that with (what we call) complete legal uncertainty which in turn dominates *Per Se*. Thus a *Per Se* procedure is never optimal. Further, we find that increased Legal Uncertainty could be associated with *higher* optimal fines.

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