On the Choice of Legal Standards: a Positive Theory for Comparative Analysis[1]

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January 2018

Abstract

The issue of which legal standard Courts and Competition Authorities (CAs) should adopt, when assessing business conduct that can violate Competition Law, with the exception of hard-core collusion and horizontal mergers, has been hotly debated for many years. While economic theory, using a welfare-based approach, has shown the superiority of effects-based standards, in practice different standards are adopted in different countries for the same conduct.

What existing theory misses is an explicit examination of (a) the choice of legal standards by Courts, taking into account how this is influenced by the substantive standard adopted; (b) how the choice of legal standards by CAs is affected by Courts' choices, recognizing that CAs place at least some weight on the implications of their choices for their reputation. Our proposed framework, takes into account these considerations and identifies the fundamental role of the judicial review process in explaining why CAs may favor *Per Se* type standards (for conduct other than hard-core agreements), with sub-optimal utilization of economic analysis, how this choice is affected by non-welfarist substantive standards set by Courts, why the legal standards for any given conduct may differ between countries and how the choice of standards affects other aspects of enforcement, such as the number of investigations undertaken.

JEL: K21, K41, L40

Keywords: Antitrust enforcement procedures, effects-based, Per Se, economic analysis, judicial review.

[1] Support from the Basic Research Programs of the National Research University Higher School of Economics, Moscow and of the Athens University of Economics and Business is gratefully acknowledged. I am grateful for very helpful comments and suggestions by S. Avdasheva, E. Fox, S. Golovaneva, J. Harrington, M. Ivaldi, F. Jenny, Juan Pablo Montero and Tom Ross, and by participants of the Annual CRESSE Conferences (July 2015 and 2016), of the Conference on "The Role of Economics in Designing Optimal Enforcement Procedures" (Belgrade, May 2016), of the 2016 Workshop in Industrial Organization (TOI, Chile, November 2016) and of invited seminars at the Analytical Center (Moscow, June 2016), the Competition Commission of India (August 2016) and the OECD Competition Committee (Paris, November, 2016), where previous versions were presented. Of course, all errors or ambiguities remain my sole responsibility. I am grateful for the research assistance of Dr. E. Metsiou and G. Makri.

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1. Motivation, Objectives and Literature Review

1.1 Motivation, objectives and main results

The issue of the choice of legal standards and of the appropriate role and the extent to which economic analysis and evidence should be applied in the enforcement of Competition Law (CL)[3] has always been and remains very controversial. How widely divergent the opinions have been and how dominant specific points of view become, in terms of their influence on enforcement practice, has varied over time and across countries and continents. Thus, while not without dissenting voices that even become dominant at certain periods over the last hundred or so years, the US (or North America) point of view has tended to give economic analysis and evidence a much more important role to that which the dominant point of view has assigned to economic analysis in (continental) Europe[4]. This divergence has become more noticeable in recent decades as a growing body of economic theory[5] using a welfare-based approach, examining what legal standard *should* be adopted (to maximize welfare), has shown the superiority of an economics-based approach with effects-based standards in many circumstances. Still, in the EU, while about 10-15 years ago there were many voices arguing for a movement towards effects-based legal standards, as many commentators recognize at present, this movement never seriously took off, so much so that recently the main question concerned whether we are actually moving towards its demise[6]. This is in stark contrast to the situation in countries such as Canada, UK and US. Recent empirical evidence suggests that the divergence in the standards adopted is also reflected in the enforcement record of other countries from the developed and developing world[7].

This paper, rather than associate the choice of legal standards[8] and subsequent role of economic analysis *in abstracto* with error-cost minimization or welfare

[3] For discussions and empirical information concerning the use and usefulness of economics in competition law enforcement see Baker (2003), Gavil (2008), Neven (2006), Schinkel (2008) and Lianos (2012).

[4] Both at the level of the EU Commission and that of Member States. For an excellent overview of the application of economics in a century of antitrust enforcement in US see Kovacic and Shapiro (2000). As Gavil et.al. (2008) note, after the *Sylvania* decision "the Court systematically went about the task of dismantling many of the per se rules it had created in the prior fifty years, and increasingly turned to modern economic theory to inform its interpretation and application of the Sherman Act". Also, Gual and Mas (2011) for the use of concepts and tools from modern Industrial Organization theory and Fisher (1989) for an early skeptical view. For an exchange that encapsulates quite perfectly the controversy raging presently again in Europe, see the articles of Wils (2014) and Rey and Venit (2015) discussing the recent EU *Intel* decision.

[5] See literature review below. The literature relied on an error-minimization approach until it was recently generalized to take account of decision errors *and* deterrence effects (Katsoulacos and Ulph, 2009 and 2010).

[6] Though the recent decision on *Intel* by the ECJ seems to provide some basis for rejuvenating the effects-based approach in EU, a close reading does not leave much ground for optimism–rather than proposing an effects-based approach the ECJ argues that the GC did not apply properly the lower standard (see also below). ECJ EU Press Release No 90/17, 6th September 2017 "Judgment in Case C-4 13/14 P Intel Corporation Inc.v. Commission.

[7] See Avdasheva, Golovanova and Katsoulacos (2015).

[8] Some clarifying comments on the meaning of terms should be useful here. By "legal standard" below we will always mean the "decision rule" used in order to undertake the assessment of *any given* conduct that potentially violates the CL. The decision rule prescribes *how* assessment should be made, in terms of the type of evidence that

maximization, proposes a positive framework that is based on (a) an explicit examination of the choice of legal standards by the CAs *in the light of the standards set by the Courts* (which examine appealed decisions of CAs), taking into account the potentially differing objectives of these institutions (b) the fact that the choice of legal standards depends on the Substantive Standard (SS) adopted[9] and (c) the fact that by their nature *CAs are best thought of as utility maximizing organizations* in which, those responsible for deciding enforcement procedures, place at least some weight on the implications of their choices for their reputation or public image. Thus, in our proposed framework, CAs maximize utility, which depends both on what they perceive to be the objectives of their principals and Courts, that we take to be to maximize the expected benefits that enforcement choices bring to competition or to consumers or to society more generally, but also on their *public image or reputation*. This is consistent with the widely recognized fact that, in many cases, CAs operate under various *performance criteria* some of which at least are *not* related to the effects of enforcement on welfare (see, for example, Avdasheva et al, 2017). Within this framework we are able to identify the fundamental role of the judicial review process[10] in understanding the choice of legal standards and the extent of economic analysis and evidence used by CAs.

More specifically, in our framework the CA's public image and reputation is determined by an indicator of *reputation-related* (or, for short *reputational) enforcement success* (see for details below) which is affected negatively when the number of infringement decisions by the CA falls and when the reversals of its infringement decisions in Courts of Appeal during the judicial review process are increased. The CA's utility is also affected positively by the impact of the CA's enforcement choices on the *quality of its enforcement,* measured by the expected benefits that these choices bring to competition or to consumers or to society more generally. Of course, different CAs will place different weights on these factors that influence utility, depending on the specific characteristics of the jurisdiction in which they operate (such as its maturity, the degree of autonomy of the CA and the objectives of its principals[11]). Using this framework, we analyze the CA's optimal

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the CA will seek and consider, the presumptions on which it will rely and the series of tests and economic argumentation that will take into account in making the assessment and reaching a decision. The decision rule can differ for different conducts: sometimes relying on general presumptions and proving certain behavior has taken place will be all that is required; in other cases detailed market investigation and proving likely or actual effects of the *specific* conduct will be required. Below we will treat "effects-based" as more or less synonymous to "economics-based" (a term that has also become very popular in Europe in recent years). Sometimes, legal scholars draw a distinction between "rules" (like Per Se) and "standards" (like "rule of reason") – see for example, Blair and Sokol (2012). Below we neglect this distinction.

[9] Sometimes, the notion of "substantive (or liability) standard" seems to be confused with that of "legal standard". The two notions are clearly distinct. The substantive or liability standard is the *criterion used (e.g. impact on consumer welfare) in order to decide whether or not a conduct violates the law*. Legal standards refer to *how* decisions are reached.

[10] For other important attributes of this process see Katsoulacos and Ulph (2011), Geradin & Petit (2006) and Shavell (1995).

[11] As expressed in the differing substantive standards encapsulated in the CL of different countries and adopted by Appeal Courts (see also below).

choice of legal standard (and, hence, application of economic analysis and evidence in CL investigations) and its optimal choice regarding the number of investigations undertaken and decisions reached.

Our main results are as follows.

A reputation sensitive CA may well adopt, in assessing some conducts, a lower legal standard, closer to Per Se[12], utilizing a sub-optimal amount of economic analysis and evidence, than the optimal legal standard that would be adopted by Courts if their objective was to maximize the wider social benefits of competition law enforcement. This is more likely (Propositions 1 and 2):

(i) When the CA's utility depends just on reputational concerns so it does not take into account the implications of its choice of standards on the quality of enforcement, in terms of avoidance of decision errors and adverse deterrence (or incentive) effects.

(ii) When the CA is uncertain, in relation to what legal standard will be chosen by Courts for any given conduct. So, this is particularly likely to occur in *young jurisdictions*, in which CAs are not well informed[13] about Courts' choices – they do not know with certainty what legal standard will be considered by the Courts as the right standard for any given conduct – and, in which, average investigation costs are likely to rise steeply as more sophisticated analyses and techniques are applied with higher legal standards.

(iii) When there is no uncertainty regarding the legal standard that will be chosen by the Courts, as we expect to be the case in *mature jurisdictions*, if the average investigation costs are sufficiently convex, with respect to the amount of economic analysis used, *relative* to the increase in the probability of decision annulment when a (wrong) lower standard is used.

A corollary of the above results is that when Courts adjust legal standards adopted for a given conduct, following the evolving developments in economic science and empirical evidence, this may not be followed by the CAs.

The model can help to explain empirical evidence showing a non-monotonic relation between the probability of annulment of the CA's decisions, and the economic analysis applied in assessment (i.e. the legal standard adopted) (Proposition 3). A probability of annulment that decreases with increasing economic analysis can be interpreted as follows. Say that for some cases (X) the CA uses a *low (l) legal standard, $LS_{l,X}$, rather than the higher legal standard (h) adopted by the Courts, $LS_{h,X}$:* this makes the probability of annulment of cases X higher, than if it used the same legal standard (h) adopted by Courts. If in some other cases (Y) the CA uses the higher legal standard $LS_{h,Y}$, which is the same as that adopted by Courts, the probability of annulment in these cases will be lower than when the lower (but "wrong") legal standard is used in cases X. Data will then show a declining probability of annulment

[12] And will never adopt a higher legal standard.

[13] Due to the lack of a long enough tradition in the application of Competition Law.

as economic analysis increases in assessment of cases Y relative to cases X. On the other hand, an increasing probability of annulment with increasing economic analysis suggests that the CA uses the *same legal standards as the Courts* and an increase in these legal standards increases the probability of annulment (as discussed below).

Other important results, emerging from our analysis are:

The legal standards adopted by CAs will be lower (closer to Per Se), when Courts adopt non-welfarist substantive (or, liability) standards, as is common in Europe but also in the developing jurisdictions (Proposition 4). This may be an important factor explaining the lower standards adopted in EU relative to those in other mature jurisdictions such as US or Canada.

The higher the legal standard adopted for a conduct (that is, the closer the standard to effects-based) the *smaller* the optimal number of investigations (decisions reached) for this conduct by the CA (Proposition 5).

Finally, jurisdictions in which Courts adopt non-welfarist substantive standards will tend, all other things equal, to be associated with more enforcement in terms of decisions reached (Proposition 5).

The structure of the paper is as follows. After a brief literature review in the next sub-section, Section 2 sets out and explains all the various elements that make up our proposed modeling framework. In Section 3 we apply this modeling framework and derive our main results concerning the optimal application of economic analysis and choice of legal standards and the optimal choice regarding the number of investigations undertaken. Section 4 provides concluding remarks, offers some recommendations and discusses opportunities for future research.

1.2 Brief literature review

Broadly speaking, there are two types of legal standards or decision rules that can be used, those (to use the terminology common in the EU) that are *effects-based* and those that are *object-based*, which in US are referred to as rule of reason and Per Se rules, respectively, though the terms are not, strictly speaking, exactly equivalent[14]. Of course, there are variations in these rules and for some purposes it is probably best to think of legal standards as forming a *continuum* at the extremes of which are the Per Se (or object-based) and the ("full") rule of reason (or full effects-based[15]) standards[16].

[14] Further, while in US a Per Se offence concerns conduct that is necessarily and irretrievably unlawful, this is not the case in EU where the object-based standard may refer to a "rebuttable Per Se" rule and an effects-based standard is usually thought of as falling short of the full-blown rule of reason in terms of how discretionary is the Authority's case-by-case decision making approach - see Katsoulacos Y and D Ulph (2009). Also, Gavil (2008), ab.cit. p.141. In EU, agreements under Art.101 are rebuttable. There are however cases in EU CL which *are* strictly Per Se prohibited: RPM, Parallel Trade restrictions and restrictions on cross-sales in vertical contracts.

[15] Below we will use the term "higher" legal standard to refer to a standard closer to rule of reason, while by "lower" standard we mean a standard closer to Per Se.

[16] Alexander Italianer, ab.cit. p. 2, referring to Justice Stevens who was probably the first to point out that one should think of legal standards (for dealing with restraints under US Section 1) as forming a *continuum* with Per Se and Rule of Reason being at the opposite ends of this *continuum*. As Italianer notes, the US Supreme Court has

Of course, the choice of legal standard may also be affected by the *substantive standard* adopted. While in academic discussions this is usually assumed to be welfarist (liability requiring a showing of adverse effects on welfare[17]), in practice this is often not the case. For example, the substantive standard may be just to "protect the economic freedom of market participants", or, the pursuit of a "system of undistorted competition" (Wils, 2014), without obligation to show adverse effects on consumer welfare or efficiency (Rey and Venit, 2015) – which would imply that any conduct that puts one or more competitors at a disadvantage would be considered unlawful[18], irrespective of the ultimate consequences of the conduct for welfare[19]. The link between substantive standards and the choice of legal standards has been discussed recently and it has been informally demonstrated (Katsoulacos, 2017) that adopting non-welfarist substantive standards increases the likelihood that Per Se legal standards are applied and a limited amount of economic analysis and evidence is utilized in investigations of specific conducts. The nature of this link and its implications are formalized below and this result is confirmed.

We can think of the difference between the two broad types of legal standard mentioned above as follows. While for certain conducts a sufficiently high standard of proof[20] of anticompetitive harm can be reached by applying an object-based legal standard, that is, purely on the basis of identifying the exact nature of the conduct, for many other conducts this will not be the case. In these latter circumstances, where the standard of proof reached by adopting object-based is too low, effects-based legal

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explicitly recognized that "the categories of analysis cannot pigeonholed into terms like "per se" or …."rule of reason". No categorical line can be drawn between them. Instead, what is required is a situational analysis moving along what the Court referred to as a *"sliding scale""*.

[17] Consumer or total welfare – see also below.

[18] The meaning of "preserving undistorted competition" was actually made clear by the EU General Court which, upholding in its entirety the Commission's Decision on *Intel*, argued that making it more difficult for a rival to compete "in itself suffices for a finding of infringement".

[19] Rey and Venit (2015) note that the effects-based standard *starts* with a showing of a distortion of the competitive process but, in order to assess this distortion and find liability, one "should (also) look at the actual or likely *effects of the conduct*", on consumer welfare or efficiency (p. 17, italics ours). Note that here we will not try to examine the pros and cons of using "consumer welfare" or "total welfare / efficiency" as the right substantive standard. There is currently quite an intense debate on this issue, with some economists arguing for a total welfare standard, e.g. D. Carlton (2007). For a recent contribution also containing a review of the recent debate see Katsoulacos, Metsiou and Ulph (2016). Also, CAs often take into account the presence of "public interest concerns" as additional liability criteria.

[20] We should stress that we will be using the term «standard of proof» rather loosely. Formally, by «standard of proof" is meant the degree of evidence required in order to establish *proof,* or for the CA to discharge its ultimate contention (that welfare will be adversely affected). Or, it is the threshold, in terms of the probability that must be met, for the CA or Court to discharge its burden of proof. Common standards (associated with a progressively higher probability) include: "substantial evidence", "Preponderance of the evidence" (or "balance of probabilities" – it is demonstrated, with at least 51% probability, that contention is true – mostly applied in civil cases), "clear and convincing evidence" and "beyond reasonable doubt" (mostly applied in criminal cases). While, however, these concepts are well understood and widely applied in common law systems, "in other jurisdictions, particularly in (EU) continental legal systems, *such "probabilistic" standards of proof generally do not exist*. The amount of evidence required is rather a question of the personal conviction of the judge (*intime conviction*). That is to say, a *party who bears the burden of proof must satisfy the judge to the point of persuading him of the existence of a pertinent fact*." (see Per Hellstrom, 2009; p. 2; our emphasis). We should stress that our use of the term "standard of proof" in this article *does not* necessarily rely on a "probabilistic" interpretation; we may interpret it as "sufficiency in the evidence required to convince a judge".

standards, relying on extensive investigation of firm and market characteristics and the application of economic analysis and evidence, are needed in order for the Authority to be able to identify whether it can reach its threshold for discharging its burden of proof and establishing its ultimate contention that the conduct will result in a reduction in welfare[21]. The exact variant of object-based or effects-based rule that is required will depend on the conduct under consideration. While of course this implies that the extent and sophistication of the economic analysis and evidence utilized under an effects-based rule is greater than that under an object-based rule, how much greater will depend on the exact variant of Per Se / object-based or effects-based rule that is used.

Existing literature has examined the question of what is the optimal choice of legal standards along the *continuum,* and hence of the role of economics in CL enforcement, assuming an welfarist substantive standard and using a *minimization-of-costs of decisions errors* framework and, more recently, a more general *maximization-of-welfare* framework (that incorporates the former). The main factors that then need to be taken into account and have been discussed quite extensively in the literature can be summarized as follows:

- the cost of decision errors (of Type I and Type II) under the alternative standards;
- the deterrence or indirect (or incentive) effects of the standards;
- whether the standard generates legal uncertainty;
- other enforcement costs (including the administrative costs of enforcement and the costs to firms of self-assessing their actions or of reducing legal uncertainty).

In a series of papers, Katsoulacos and Ulph (2009, 2011, 2015 and 2016) have attempted, by using a maximization-of-welfare framework to provide answers on how the factors above affect the choice of the (optimal) legal standard[22] and hence, indirectly, about the appropriate role and extent of economic analysis in CL enforcement. Their analyses, point quite strongly to the view that for a range of conducts, which now are understood not to be strongly presumptively illegal[23] and for which the developments in economic theory and modeling in the last 20 or so years improved significantly the discriminating quality of the assessment[24], moving to assessment with effects-based standards will improve welfare due to a reduction in the costs of decision errors and an improvement in deterrence effects[25]. But, as is

[21] Assuming that an welfarist substantive standard is adopted.

[22] Extensive references and reviews of the literature related to these issues are contained in these papers. See also J Padilla (2011), page 435.

[23] But which up to the 1990s were widely considered as strongly presumptively illegal. See for more details Katsoulacos, Avdasheva and Golovanova (2017a).

[24] That is, the ability of the assessment to discriminate accurately between harmful and benign conducts.

[25] Which are likely to more than compensate for higher administrative costs and legal uncertainty. As Jones and Kovacic (2017, p 7) note «many jurisdictions apply a rule of per se illegality, or virtual per se illegality, against some horizontal agreements such a price fixing. The extent to which such a rule should be expanded beyond this.....is

widely recognized, the legal standards actually adopted in many countries and, most importantly in the EU and its member states, remain close to Per Se (and the extent of economic analysis applied by the vast majority of CAs today remains low)[26]. As Geradin and Petit (2010, p. 31)) note, the assessment of abuse of dominance cases in EU has relied on «old, formalistic legal appraisal standards, and (has shown) a reluctance to endorse a modern economic approach»[27]. This implies that the arguments concerning decision errors, deterrence effects (as well as legal uncertainty and administrative costs), are not the only, or even the most important, influences in choosing legal standards. In practice, other factors must be important. These are at the center of the analysis of this paper. One is related to the objectives of CAs, specifically the reputational concerns of those deciding the enforcement procedures, that are affected by the judicial review of the CA's decisions. As a result of these concerns, CAs will make their choice taking into account what they anticipate to be the Courts' choice of legal standard. Finally, it must be recognized that the Courts' choices are dependent on the substantive standard adopted.

2. A Modelling Framework for Determining the Choice of Legal Standards by CAs and Courts

Formulating our proposed modelling framework requires that we first consider in detail its distinct elements. Specifically, in the following sub-sections:

(i) We start by examining the CA's utility function.

(ii) Since, central to the CA's choice of legal standard is what they anticipate will be the legal standard chosen by Appeal Courts, in the second sub-section below, we turn to the factors influencing this choice, focusing on how this is influenced by the substantive standard adopted.

(iii) We then investigate the differing objectives of CAs and Courts and the issue of information possessed by CAs about Court choices.

(iv) Next, we turn to the CA's cost constraint and

much more controversial and contested». As they indicate (p. 16) nowdays in US, vertical restraints, mergers and single-firm exclusionary behavior are not assessed by per se. Also Blair and Sokol (2012).

[26] There are exceptions to this, such as US or Canada (see Hovenkamp, 2017, especially onwards from p. 43), but the statement does reflect accurately the reality in vast majority of other jurisdictions. The statement does not concern hard-core horizontal collusion for which all arguments favor a Per Se legal standard. Thus, the type of practices that we will have in mind are the other business conduct for which there is no universally accepted choice of legal standards i.e. unilateral conduct by dominant firms, vertical restraints and concerted practices

[27] In the meantime, the importance of effects-based standards and relying on the predictions of sound economic analysis has been stressed by OECD not just in the context of developed countries but equally and perhaps more importantly in developing ones. For example, in its recent report evaluating the Russian competition authority, that has in the last few years become the largest competition authority in the world, the OECD (2013) makes as its top recommendation that the authority must "improve the quality of economic analysis and its application to competition enforcement throughout the competition authority and in support of improved judicial decisions".

(v) Next, to a detailed examination of the functions describing how economic analysis influences the Quality of Enforcement (Q) and Enforcement Success (S).

(vi) We complete this section with a description of how the substantive standard adopted affects these functions.

2.1 The CA's utility function

Our model of the determination of legal standards adopted by CAs, in assessing any given conduct type[28], is based on two fundamental premises which form the basis for formulating the CA's utility function. The first premise is that, as already noted, the CA has to make choices in the light of the legal standards set and the liability standard adopted by the Appeal Courts, which examine those of its decisions that are appealed. The second premise is that the CA is a government agency[29] and as such it will typically enjoy a certain degree of freedom to choose among different possible courses of action. Given this, its objectives (or, the objectives of the CA Head and Commissioners) may be concerned with the overall objectives of its principals and Courts for the agency's enforcement activities, but also with the organization's (and hence their) public image or reputation[30].

We will assume that these overall objectives are reflected in the substantive or liability Standard adopted by Courts, which differ between jurisdictions, though economists usually assume these objectives to be welfarist i.e. associated with either consumer or total welfare[31]. Thus, while the CA Commissioners are concerned with the wider social benefits of the CA's activities, as reflected in consumer welfare or the preservation of a competitive environment, the impact on which depends on the CA making the right choice of legal standards *in terms of avoidance of decision errors and of adverse deterrence (or incentive) effects*, that is on the *Quality of Enforcement*, they are also attaching value to how the CA's enforcement activities impact on their reputation and public image, or what we term the Reputation-related (or, for short, the *Reputational*) *Success of Enforcement*.

Good reputation, which is essential for the furtherance of career concerns, is often dependent on what the public and the market for professionals perceive as "success", as measured in terms of certain easily identifiable and objectively measured criteria. Indeed, these are often reflected in formal "performance criteria" which provide the

[28] The discussion below covers all conducts examined by CAs, other than mergers.

[29] With a degree of independence that varies quite a lot between countries.

[30] See for a discussion of these assumptions and of empirical evidence, as well as for a review of related theoretical work, Schinkel, et. al. (2014). They construct a model to examine the behavior of government agencies by assuming the same overall objective as we advocate here. As they note, in governmental agencies like Competition Authorities, the measurement of "output", in terms of the welfare impact of activities is difficult and this allows other performance criteria and hence incentives than just impact on social welfare to hold. For example, as Lever (2009) stresses, agency officials may try to minimize their "mistakes" for fear of been publicly marked as incompetent rather than try to maximize social welfare.

[31] See for detailed discussion below about the significance of the liability standard in our analysis.

basis for identifying the extent of success of the CA in performing its enforcement duties, and which are used in order to appraise the head and the commissioners on the basis of their "case record"[32]. These formal performance criteria certainly include the investigations undertaken and decisions reached and also the extent to which Courts of Appeal uphold these[33].

Given these remarks we can formalize the CA's objective function through a utility function (U) that depends on the reputation (R) and the quality (Q[34]) of its enforcement activities.

Reputation is determined by the *Reputational Success of Enforcement* (S) of the CA. Assuming that the CA's enforcement efforts are directed to K potentially anticompetitive business conduct types, S is a function of enforcement success in investigations of these different conducts:

$$S = S(S_1, S_{2,}..., S_K) \quad (1)$$

and reputation is given by:

$$R = R(S), R'_{S_k}(S) > 0, R''_{S_k}(S) < 0 \quad (2)^{35}$$

That is, reputation increases (at a diminishing rate) as S_k increases[36].

Generally, the CA's utility from enforcement related to conduct k = 1,……..,K can be expressed as:

$$U_k = U_k(R_k(S_k(D_k, e_k(LS_k))), Q_k(e_k(LS_k))), \partial U_k / \partial R_k, \partial U_k / \partial Q_k > 0, k = 1,....K \quad (3)$$

We will take S_k to be determined by:

$$S_k(D_k, e_k(LS_k)) = D_k(1 - \Phi_k(e_k(LS_k))), k = 1,....K \quad (4)$$

where

D_k = *infringement* decisions reached on conduct k;

e_k = a measure of the extent to which economic analysis and evidence is utilized on average in the assessment of *specific* investigations relating to conduct of type k, which depends on the legal standard (LS_k) *and* on the liability standard adopted in assessing conduct k; for much of the discussion, where we assume that the liability

[32] As Kovacic et al (2011) note "….CA heads have concerns other than social welfare, including "being busy" with an eye to the media and political superiors".

[33] See Avdasheva et.al (2017).

[34] Since we will assume that the CA makes choices taking into account what it expects to be the choices of the Appeal Courts, a question that emerges is whether we could avoid incorporating directly Q (and, hence, indirectly the wider social benefits from enforcement) also in the utility function of the CA. While our analysis could be undertaken and its main results would not be affected with a utility function in which Q is not an argument, the fact that in some important cases the CA's performance criteria incorporate explicitly the benefits that enforcement generates for consumers (e.g. for UK's CMA, where the benefit to consumers must exceed by a factor of 10 the cost of enforcement; see, for a brief review of performance criteria, Avdasheva et.al. 2017) explains why we have chosen to leave Q as affecting directly the utility of the CA.

[35] For the simple cases where there is no danger of confusion, we will use subscripts to indicate derivatives, otherwise we will write them explicitly.

[36] In principle, the increase in reputation will depend on k (the type of conduct) given that investigations regarding different conduct types may affect differently the CA's *public image* – e.g. because investigations of conduct k are more likely to involve *high-profile cases* than investigations of other conducts.

standard is consumer (or total) welfare we suppress reference of the dependence of the CA's choices of LS on the liability standard.

$\Phi_k(e_k(LS_k))$ = probability that an *infringement* decision is reversed by Courts of Appeal given the legal standard (LS_k) and the liability standard adopted. Reversed decisions harm the reputation of the CA and its public image. This has the implication that, *ceteris paribus*, the CA will prefer to adopt legal standards that lower the risk of having its infringement decisions reversed.

$Q_k(e_k(LS_k)$ = a measure of the quality of enforcement in investigations of conduct k, for any given LS_k adopted[37] (and, hence, given e_k), in terms of the welfare benefits of lowering costs of decision errors and adverse deterrence effects.

Since the expected reversals of infringement decisions reached on conduct k given the Legal Standard (LS_k) adopted, depend on the probability that a conviction will be appealed against and the probability that an appealed decision will be reversed by an appeal court[38] we have:

$$\Phi_k(e_k(LS_k)) = \varphi_k^r(e_k(LS_k)).\varphi_k^A(e_k(LS_k)), k = 1,....K \quad (5)$$

where:

$\varphi_k^r(e_k(LS_k))$ = probability that an infringement decision on conduct k investigated under LS_k, *that is appealed,* is finally reversed in Courts of Appeal.

$\varphi_k^A(e_k(LS_k))$ = probability that an infringement decision of conduct k given LS_k, leads to an appeal.

The objective of the CA is to undertake investigations (and reach decisions, D) and to adopt legal standards (LS) and apply economic analysis (e), that maximize its utility taking into account a cost constraint and the constraints imposed by the anticipated choices of legal and substantive standards by Courts of Appeal. Before we proceed further, below we provide some comments on the relation of economic analysis to legal standards and to justify our focus on the infringement decisions of the CA.

Formalizing the relation of economic analysis to types of legal standards

The rationale of functions (3) and (4) is that increased economic analysis and evidence are associated with "higher" legal standards[39] (LS_k), for assessing some conduct-type k and will influence the CA's utility by affecting the probability of decision reversals (Φ) in Courts of Appeal[40] and hence the reputational success (S) of enforcement (function (4)). Also, e_k, LS_k affect utility by affecting the quality of enforcement (Q), given that, depending on the conduct, different legal standards will

[37] And, the liability standard adopted. As noted, we suppress reference of the dependence of the CA's choices of LS on the liability standard until the point (below) where we explicitly allow the latter to be non-welfarist.

[38] We return to a discussion of the determinants of these probabilities below.

[39] That is, standards closer to Full Effects-Based.

[40] In ways that will be discussed in detail below.

have different implications / impact for the decision errors and deterrence effects of enforcement[41].

In this paper we treat LS_k and e_k as continuous variables for reasons of analytical tractability. In practice, a number of specific distinct legal standards will be recognized, higher standards being associated with additional *specific blocks* of economic analysis[42] - where we think of each block as containing a, potentially varying, degree of economic thinking and evidence that can be progressively applied until higher standards are reached. In this sense, the relation between LS_k and e_k can be considered as an increasing step function (as depicted in Figure 1 below). When no economic analysis and evidence is utilized and the question of liability of the *specific* conduct relies just on information about the nature and characteristics of the conduct (and what we can presume about the consequences of the general class of conducts with similar nature / characteristics) then we take it that the value of $LS_k = 0$. A positive value of LS_k implies that at least some contextual economic analysis $\underline{e}_k$ relating to the *specific* conduct is undertaken. Below, we distinguish between what is termed a Strict Per SE (SPS) legal standard, a Modified Per Se (MPS) legal standard - which implies that contextual market analysis sufficient to establish the extent of extant market power, is undertaken - a Truncated Effects Based (TEB) legal standard - which implies that additional blocks of economic analysis and evidence are utilized in order to establish that the *specific* conduct and market characteristics generate exclusionary or market power enhancing effects - and a Full Effects Based (FEB) legal standard – that again implies that additional blocks of economic analysis and evidence are utilized (to those utilized under TEB) in order to establish the net effect of the *specific* conduct on some measure of welfare taking into account potential efficiencies to be generated by this conduct.

Remarks on the variable D_k (infringement decisions)

Here we provided some clarifying comments on the link of the reputational success of enforcement to the number of non-reversed *infringement* decisions reached by the CA. Why focus on *infringement* decisions? It is true that there will also be acquittal decisions that are appealed, by the parties affected by the allegedly anticompetitive conduct and some of these appealed decisions will also be reversed by the Appeal Courts. There are, however, a number of important reasons why focusing on just infringement decisions seems reasonable. One is that public image or reputation-building is likely to rely mainly on non-reversed appealed infringement

[41] We examine both of these effects in detail below.

[42] We can think of such blocks as those associated with, for example, market definition, identifying market power, identifying whether market conditions are conducive to horizontal collusion, modeling oligopolistic interaction and identifying whether a conduct has exclusionary effects, developing a theory of harm, identifying efficiencies and their effects, examining a counterfactual etc. See for details and a methodology of how such blocks can be used to construct effects-based (EB-) indicators, Katsoulacos, Avdasheva and Golovaneva (2017b).

decisions rather than on non-reversed appealed acquittals[43]. While performance criteria that CAs have to satisfy and on which their reputation depends, often push for maximizing the total number of non-reversed decisions, a number of factors indicate that reputation building must rely on non-reversed infringement decisions. Thus, political superiors would prefer that CAs consider mainly presumptively illegal (rather than presumptively legal) conducts, that is conducts that, on average, are expected to be socially harmful (and, hence, infringe CL). This means that CAs in their *ex-officio* or market investigations will focus on such conducts and also their prioritization procedures will put much higher weight to investigating such conducts. Another factor is that, *ceteris paribus*, reaching infringement decisions that are not reversed in courts of appeal will be seen as a much safer predictor of the CA's ability to deal successfully with «hard» cases given that, often, the importance of acquitting a firm from an alleged violation is heavily discounted as being the anticipated outcome, in view of the excessive accusations made by rivals motivated by purely selfish objectives and, also, given that a much larger fraction of decisions in which violation is found is likely to be appealed (as violators have the incentive to try to avoid the monetary and other sanctions as well as the reputational costs associated with such decisions)[44]. This is confirmed by empirical evidence, which shows that by far the largest number of appeals is against infringement decisions by the alleged violators of the law [45].

Thus, while undertaking the analysis by interpreting D_k as the total number of decisions reached in conduct k is feasible and will not affect our results, focusing on infringements decisions certainly allows us to concentrate on the empirically relevant and important sub-set of decisions reached by CAs, given our interest is also to provide empirically testable propositions concerning the impact of the judicial review process on the decisions that are appealed[46].

2.2 Choice of Legal Standards by the Appeal Courts

[43] CAs are seen by the wider public and their political superiors as institutions established in order to stop firms undertaking genuinely anticompetitive actions with negative impact on large sections of consumers rather than as managing to rightly acquit actions that do not cause any harm. The latter is unlikely to capture the attention of the public and those (like the media) influencing public opinion and to enhance the public image of the agency.

[44] For example, in Russia, one of the many countries in which non-reversed decisions reached is the most important performance criterion used to assess FAS, *only* non-reversed infringement decisions enter into the performance assessment. In Schinkel et.al. (2014), reputation is derived from the decision of high-profiled but, at the same time, difficult tasks.

[45] To give a few examples: in France between 2000 – 2015, 63% of infringement decisions were appealed as against only 16,3% of acquittal decisions that were appealed. In Greece between 1996 – 2015, over 78% of infringement decisions were appealed while less than 14% of acquittals were appealed. In Russia during 2008 – 2012 a negligible fraction of acquittals were appealed as against a large fraction (of about 40%) of infringement decisions that were appealed (see, Avdasheva et.al. 2015). The EC reached 137 infringement antitrust decisions between 2000 and 2016 of which 71% (97) were appealed.

[46] Empirical work using the theoretical framework presented in this paper has been under way with a number of co-researchers in a number of countries for over two years. The work is based on data sets of antitrust infringement decisions in the EC (1992 – 2016), Greece (1996 – 2015), France (2000 – 2016), Turkey (1996 – 2016) and South Africa (2000 – 2016). See also section with concluding remarks.

We will consider Courts as deciding which legal standards are appropriate for assessing specific conducts taking into account the following factors:

(i) What they consider to be the legal standard that is most appropriate in assessing specific conducts, in terms of the wider social benefits generated by its adoption, given that, for any conduct, legal standards adopted will have different implications / impact on decision errors and deterrence effects. To select the legal standards that are best in terms of error avoidance and deterrence[47] it is important to consider what the evolving body of economic theory and evidence suggests in relation to the potential anticompetitive and efficiency effects of different conducts, that affect the strength of the *presumptions* that can be made about the effect on average of these conducts. Also, the discriminatory quality of the available underlying economic models must be considered – in terms of their ability to distinguish harmful from benign cases in specific investigations[48]. If the presumptions are very strong[49] and the discriminatory quality of economic models is low, Per Se or close to Per Se standards should be selected. If the presumptions are relatively low and the discriminatory quality high then EB legal standards should be preferred.

(ii) What they consider should be the appropriate objective(s) of CL enforcement and, hence, the substantive (or liability) standards (SS) that they adopt. The SS adopted will influence, as we show below the choice of legal standard. Substantive standards differ substantially between countries as in different jurisdictions there are different views as to what should be the objectives of competition policy. More specifically, while in some cases welfarist objectives are incorporated among the criteria of assessment, in order to define under what circumstances there will be a liability finding, there are significant variations between jurisdictions in practice as evidenced by case-law, in relation to:

   (a) Whether the welfarist objectives cover just consumer welfare (as would seem to be the case in UK and US), or extend to wider welfare notions of economic efficiency or total welfare (as, for example, in Canada[50]).

   (b) Whether welfarist objectives are replaced by other competition-related objectives such as "putting competitors at a disadvantage" or "protecting the competitive process" (adopted in Europe) that can be considered as part of a set of criteria for assessing impact on welfare but, on their own, do *not*

[47] See for details Katsoulacos and Ulph (2009).

[48] As Blair and Sokol (2012) describe "In the US, it was the law-and-economics academy that first transformed the analysis of antitrust, starting in the 1950s. The Courts followed, responding to the emerging scholarship. Courts began to shift antitrust doctrine from per se to rule of reason (and greater economic analysis) starting in the late 1970s, while at the same time transforming procedural standards. These changes next influenced the antitrust agencies, which in turn further strengthened the changes within the courts".

[49] So the assessment in specific investigations can rely on general presumptions about general categories of conducts.

[50] See recent decision on *Commissioner of Competition v. Tervita Corp.*

constitute a complete assessment[51]. What is important in this respect in our context is that, as we show below, non-welfarist SSs will imply that Courts will favor lower legal standards[52].

(c) Whether other "public interest" objectives become an important part of the assessment procedures[53].

(iii) The country specific institutional context and legal traditions. Young jurisdictions will take into account international best practice. Also, such jurisdictions and jurisdictions, in which there is no tradition in the application of economic analysis and evidence in legal proceedings and, specifically, in competition law enforcement, especially when the latter surpasses a certain amount of sophistication and complexity or in which judges lack any formal training in economics and the necessary relevant experience in assessing economic arguments will tend to rely less on what evolving economic theory and evidence suggests about the potential effects of different conducts[54] and will tend to rely on low legal standards.

The above considerations determine the choice of legal standards by the Courts and hence what they would consider as appropriate levels of economic analysis and evidence in the assessment of specific conducts[55]. So, let $LS_k^{C,j}$ be the Legal Standard adopted by Courts (C) in country / jurisdiction j for conduct k. From the discussion above:

$$LS_k^{C,j} = f(E_k(SS^{C,j}), SS^{C,j}, I^j) \qquad (6)$$

where E_k measures what the economic, theoretical and empirical, literature suggest is the appropriate legal standard for any given SS adopted by Courts for conduct k (specifically, it measures the strength of the presumption of illegality and the

[51] For a discussion of the multi-objective concerns characterizing EU CL enforcement see also Blair and Sokol (2012, p. 2510 – 2513). See also the discussion of the Intel case in the Introduction – based on the contributions by Wils, Rey& Venit and Peeprcorn (2013). The Non-Disadvantaging Rivals objective can also be thought of as one of protecting Consumer Choice – see below and Coniglio J.V (2017).

[52] A first examination of this relationship is given Katsoulacos (2017).

[53] See, for example, Katsoulacos, Avdasheva and Golovaneva (2017a).

[54] While these will certainly tend to hold in the relatively newer jurisdictions of, for example, the BRICS and other developing countries they may well hold too, at least to some extent, in the more mature jurisdictions (e.g. of the EU) in which the legal tradition is not one that is receptive to economic arguments in substantive evaluations of CL cases (see for a good discussion, Blair and Sokol, 2017, p. 2513 – 2516). It is worth stressing that there is significant variation even between countries within each of these two categories. Thus, in the jurisdictions in which enforcement of competition law is quite new the above argument is likely to hold less in a country like South Africa where the legal institutions and traditions have long been under Anglo-Saxon influence and, among mature jurisdictions, it is more likely to hold in European continental countries than in the US, UK or Canada.

[55] As Geradin and Petit (2010) note (p. 20) "the EU Courts have developed legal standards both with respect to the procedural and substantive aspects of competition law….. (with regard to the latter) the EU Courts have developed in their case law a variety of legal standards that should be relied upon to determine the compatibility with EU CL of a wide range of commercial practices susceptible of creating anticompetitive effects, including horizontal agreements, vertical agreements, exclusive dealing, rebates, predatory pricing, selective price cuts, tying and bundling, refusal to supply, margin squeeze….. An important observation with respect to these legal tests is that they are intensely "*economic*" in nature….".

discriminatory quality of the economic models[56]), $SS^{C,j}$ is the SS adopted by Courts in jurisdiction j and I^j captures the institutional and cultural / historical context in jurisdiction j.

Let us start by assuming that the *SS is that of consumer or total welfare (i.e. the SS is welfarist)*, an assumption to which we return below. Also, consider some specific jurisdiction, which allows us to drop for the moment superscript j. Finally, assume that the optimal choice of LS that Courts can adopt is among one of four potential legal standards, specifically, Strict Per Se (SPS), Modified Per Se (MPS), Truncated Effects-based (TEB) or Full Effects-based (FEB), that is:

$$\widehat{LS}_k^C = \{SPS, MPS, TEB, FEB\} \qquad (7)$$

$\widehat{LS}_k^C$ will be the *LS that minimizes decision errors and adverse deterrence effects* in assessments of conduct k. Under the SPS standard the CA makes decisions on the basis only of the purely formal characteristics of the conduct, relying on strong presumptions about the implications of the general class of conducts to which the specific conduct belongs for welfare. The MPS standard can be considered as a Per Se rule subject to a SMP requirement or, more generally, as supplementing Per Se by undertaking analysis of market characteristics as, for example, in assessing conducts under abuse of dominance or in an information exchange agreement or in a concerted practice for which there is no strong hard evidence of collusion. Depending on the results of this additional analysis we then decide whether or not we can presume adverse welfare effects. Truncated Effects Based (TEB) is an intermediate standard, in which assessment additionally requires showing, following a specific investigation of the conduct and market characteristics, whether it belongs to a class (of conducts and market characteristics) that distort the competitive process by disadvantaging rivals (i.e. through exclusionary effects, widely defined) or by enhancing market power (as in a concerted practice case) and, as a result, *can be presumed* to adversely affect welfare. Finally, FEB represents the case under which all potential anticompetitive *and* pro-competitive effects of the *specific* conduct must be assessed and compared[57]. Different countries and the same countries over different time periods have been adopting one or another of these alternative legal standards for assessing vertical restraints, concerted practices or conducts under abuse of dominance.

Given some LS_k^C we assume that it is possible to determine the optimal extent of economic analysis and evidence that is associated with that LS_k^C in investigations of conduct k. Let:

[56] See Katsoulacos and Ulph (2009) for a formal analysis deriving indicators of the "strength of the presumption of illegality" and of "discriminatory quality" and using them to provide an welfare comparison of legal standards.

[57] In summary and simplifying somewhat, under (strict) Per Se only conduct characteristics are examined and assessed, under MPS these are examined as well as market characteristics, under TEB additional analysis establishing exclusionary or market power enhancing effects is undertaken and under FEB the above are supplemented by additional analysis and evidence to establish the net effect of the specific conduct on some measure of welfare taking into account potential efficiencies.

$\hat{e}^{C}_{k,LS_k}(SS^C)$ = amount of economic analysis and evidence that Courts in jurisdiction j will consider as optimal under LS^C_k given the SS. Since now we assume an welfarist SS we use the symbol "w" as superscript to indicate this, so:

$\hat{e}^{C,w}_{k,LS_k}$ = the amount of economic analysis and evidence that Courts in jurisdiction j will consider as optimal under $LS^{C,w}_k$ when the SS is welfarist. If a non-welfarist SS is adopted, the optimal amount of economic analysis will be, *ceteris paribus*, lower (see also Lemma 2 below)[58].

Also, if $LS^C_k = \widehat{LS}^C_k$ is the optimal legal standard for conduct k (that minimizes decision errors and adverse deterrence effects), , the optimal e associated with this will be $\hat{e}^{C,w}_{k,\widehat{LS}_k}$.

Finally, let:

$e^{CA,w}_{k,i}$ = indicator of the (average) extent of economic analysis and evidence used by the CA in investigations of a conduct of type k, given the SS is welfarist and the legal standard $LS^{CA,w}_{k,i}, i = SPS, MPS, TEB, FEB$, is used[59]. Thus, we have:

$$\hat{e}^{C,w}_{k} = \{\hat{e}^{C,w}_{k,SPS}, \hat{e}^{C,w}_{k,MPS}, \hat{e}^{C,w}_{k,TEB}, \hat{e}^{C,w}_{k,FEB}\} with \quad \hat{e}^{C,w}_{k,SPS} < \hat{e}^{C,w}_{k,MPS} < \hat{e}^{C,w}_{k,TEB} < \hat{e}^{C,w}_{k,FEB} \tag{8}$$

According to (8) if a Court adopts FEB as the appropriate LS for a conduct k then it will consider that the optimal economic analysis and evidence associated with this is greater than it would be if TEB was considered the appropriate LS, with the optimal economic analysis and evidence associated with TEB being greater than it would be if MPS was considered the appropriate LS. Note that it may be that, for any two conducts k and k' the optimal amount of economic evidence that is required by Courts under any given LS may differ. That is:

$$\hat{e}^{C,w}_{k,i} \neq \hat{e}^{C,w}_{k',i}, k \neq k', i = SPS, MPS, TEB, FEB \tag{9}$$

given that, for example, the range of market characteristics that must be examined, market modeling undertaken and evidence required to show anticompetitive effects or efficiencies, can differ from conduct to conduct.

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[58] With an welfarist SS, if, for example, the optimal LS is the TEB one, the CA has to show that the specific conduct belongs to the class of exclusionary conducts for which it can be *presumed* that they are *welfare reducing*. With a non-welfarist SS if the liability criterion is, say "exclusionary effect" and the CA uses an "effects-based" LS, it has to show that the specific conduct has an "exclusionary effect" but NOT necessarily welfare reducing.

[59] For an approach to constructing these indicators of economic analysis and evidence for undertaking empirical work, see Katsoulacos et.al (2017b). Clearly, if the CA decided to use, for example, a strict Per Se legal standard when faced with a price-fixing conduct the amount of economic analysis that it will apply (e) in its investigation of the specific case and reaching a decision will be very small (if there is hard-evidence that price-fixing did occur). This is so notwithstanding the fact that the CA's decision to use a strict Per Se is based on a very *strong presumption of illegality* of price-fixing that in turn relies on a very robust and long established body of economic theory that shows that price fixing agreements will have detrimental welfare effects.

A final important observation here is that CAs will be constrained from utilizing economic analysis and evidence below a *mandatory minimum level of e* ($\underline{e}_k$) which is set by laws, guidelines, performance assessment criteria and case-law (setting e below this level would essentially imply that its decision will be annulled by Courts with very high probability) and which to some extent depends on the type of conduct investigated. Clearly there is a minimum e that the CA will use if it relies purely on general presumptions for assessing a specific case, as under a SPS legal standard. However, the mandatory minimum level of e may be higher than that required under a SPS legal standard. The most important mandatory application of economic analysis in the enforcement of CL, beyond that required by a SPS legal standard, is that related to the establishment of market shares and SMP, usually on the basis of the Hypothetical Monopolist test – as for conducts examined under abuse of dominance. Thus below we will take $\underline{e}_k$ to satisfy:

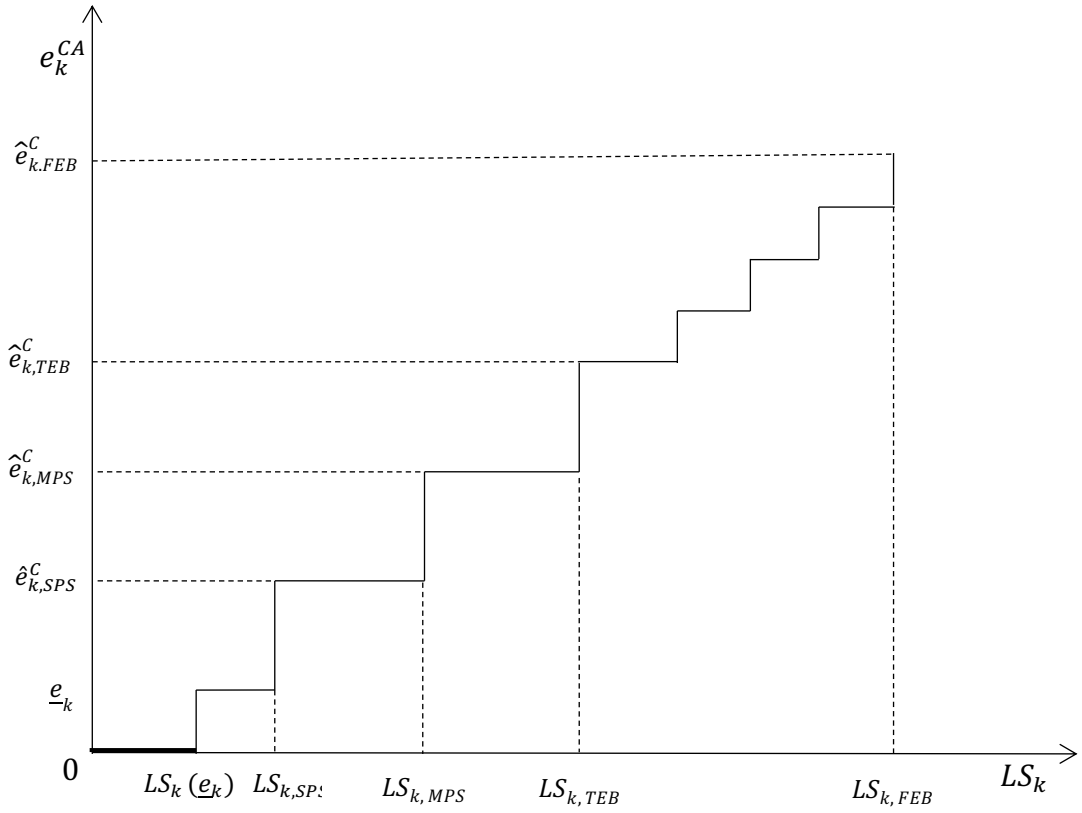
$$e_{k,i}^{CA,w} \geq \underline{e}_k$$
$$\underline{e}_k \leq \hat{e}_{k,MPS}^{C,w} \qquad (10)$$

As noted above, when shifting from a lower to a higher legal standards, e.g. from a SPS[60] to MPS or from MPS to TEB, the CA will have to undertake a series of additional distinct steps or "blocks" of economic analysis and economic tests that require potentially additional evidence, each of which is necessary in order to achieve the higher optimal e associated with the higher standard. The Figure below illustrates this increase in the value of e associated with a higher legal standard[61].

Figure 1

[60] For which we can take the amount of economic evidence to be negligible or zero as assessment relies on just the form of the conduct.

[61] Specifically, Figure 1 shows the inverse functional relationship between LS_k and e_k mentioned above.



2.3 Assumptions about information

If one were to assume that:

(i) The Courts and CAs had exactly the same objectives when choosing legal standards;

(ii) There are well defined blueprints about exactly how different standards should be applied and Courts and CAs are equally well aware of these and use them in exactly the same way to reach the same conclusions;

(iii) The CA has perfect information about the legal standards that Courts consider appropriate for each conduct,

then, of course, annulment rates of CAs decisions by Courts would be zero – indeed under such circumstances it is difficult to find motivation for costly appeals by those whose conduct has been found to violate CL.

However, in practice we observe high rates of appeal and also quite high rate of annulment of infringement decisions[62] so these assumptions do not hold.

[62] The rates vary across countries, but as noted above the evidence shows appeal rates that usually exceed 50% while there is greater variation in annulment rates both across countries and across categories of conduct. In the period 2000 – 2016, of 97 infringement decisions of the EC, 49 were annulled (51%). The empirical evidence provided by Geradin and Petit (2010) for the EC for the decade 2000 – 2010 shows that annulment was low in abuse of dominance cases.

Concerning assumption (i), while Courts may be assumed to decide which legal standards are appropriate in order to maximize the wider social benefits from enforcement, related to the competitive process, consumer choice, consumer welfare or efficiency[63], as already explained, CAs will *also* be concerned with their reputation and public image and indeed they will often be judged by performance criteria that relate to the number of decisions reached and the extent to which these were upheld in Courts of Appeal[64].

Concerning assumption (ii), there are not perfect generally applied blueprints (especially for high legal standards), Courts and CAs do not apply the same legal standard (indeed one of our objectives is to explain this) and, when they do, they do not do so in the same way – because beliefs and perceptions about the exact models and about the tests and data that should be utilized and applied will be different for CAs and Courts and results / predictions will be open to different interpretations in terms of their validity and / or weight (importance).

Finally, CAs may not have good information about what Courts will choose as legal standard. This will be so because:

(a) the CAs operate in young jurisdictions with no tradition in the enforcement of Competition Law;

(b) Courts' views about what is the appropriate standard for assessing a specific conduct are changing over time with evolving developments in economic science. However this consideration will influence Courts views very slowly over time so we can take CAs in mature jurisdictions (such as those of US and EU) as knowing with very high probability what legal standard will be applied by Courts.

The above implies that the analysis applied is likely to be different for mature and for young jurisdictions. In young ones, the natural assumption is that CAs do not know with certainty what legal standards are adopted by Courts. In mature ones, the natural assumption is that CAs do know. Our analysis below covers both of these cases.

2.4 The cost constraint

Coming next to the CA's cost constraint, we assume that the CA utilizes its resources to detect and investigate cases and reach decisions and to defend its decisions in the Courts of Appeal. In practice the authority will use resources for a number of other activities[65], but here we will assume for simplicity that the CA will always be able to implement the optimal number of decisions and utilize the optimal

[63] Though they may also be influenced by "public interest" objectives, especially in developing countries.
[64] See Avdasheva et.al. (2017) for a comparison of performance criteria used in various countires.
[65] Such as advocacy and preventing recidivism.

amount of economic evidence per case, as determined below, and just allocate the rest of its resources to these other activities[66].

The CA's cost constraint can be written as:

$$\sum_{k=1}^{K} C_k + C_{other} \leq \overline{C} \qquad (11)$$

where

C_{other} = cost of all "other" activities

$\overline{C}$ = total resources available to the CA

C_k = total cost of reaching infringement decisions on conduct k given the LS adopted. This is given by:

$$C_k = c_k^D(e_k(LS_k))D_k + \varphi_k^A(e_k(LS_k),\underline{x}))c_k^A(e_k(LS_k))D_k \qquad (12)$$

where

$c_k^D(e_k(LS_k))$ = cost per *investigation* (decision reached) on conduct k given the LS adopted.

$c_k^A(e_k(LS_k))$ = cost per appeal against decisions reached on conduct k given the LS adopted.

$\underline{x}$ = all other factors that influence the probability of appealing an infringement decision.

We will take it that:

$$(\partial c_k^D / \partial LS_k), (c_k^A / \partial LS_k) > 0, k = 1,.....K \qquad (13)$$

that is, the cost per investigation and the cost per appeal increase when a higher LS (i.e. one closer to Effect-Based) is adopted (since this will require additional resources for extended economic analysis and evidence to be used).

From (12), the marginal cost (MC) of *decisions* of type k are equal to the average cost of *decisions* (AC) of type k, or:

$$AC_k^D = \frac{C_k}{D_k} = MC_k^D = c_k^D(e_k(LS_k)) + \varphi_k^A(e_k(LS_k),\underline{x}))c_k^A(e_k(LS_k)) \qquad (14)$$

Since an increase in LS_k implies an increase in the average amount of economic analysis and evidence utilized we assume that

$$\frac{dMC_k^D(LS_k)}{dLS_k} = \frac{dAC_k^D(LS_k)}{dLS_k} > 0 \qquad (15)[67]$$

[66] This is essentially the same assumption as that made by Harrington (2011, p. 2), who considers the number of cartels successfully prosecuted by a CA, neglecting the issue of the allocation of resources to this relative to other activities that the CA undertakes. See his footnote 2 for a justification of not endogenising the amount of resources allocated to different activities.

[67] This assumes that the probability of appealing does not fall with LS_k or, if it does, the fall is not significant enough to outweigh the effect on c_k^D.

2.5 The Q_k and Φ_k functions

The Q_k function

From now on let us assume for simplicity that $\underline{e}_k = \hat{e}^{C,w}_{k,SPS}$, so the minimum mandatory value of e_k is that associated with the SPS legal standard. As noted above, when shifting from a lower to a higher legal standard, e.g. from a SPS to MPS or from MPS to TEB, the CA will have to undertake a series of additional distinct steps of economic analysis and economic tests requiring potentially additional evidence, each of which is necessary in order to achieve the higher optimal e associated with the higher standard. We will assume that, given the legal standard, the application in investigations of additional economic analysis and evidence does not reduce (it increases or may leave unchanged) the quality of enforcement. E.g. the quality of enforcement will not be affected by additional economic analysis beyond $\underline{e}_k = \hat{e}^{C,w}_{k,SPS}$ for some types of conducts for which the use of a SPS legal standard is justified, by very strong presumptions concerning the negative welfare effect of these conducts (e.g. horizontal price fixing). For these, the use of economic analysis for investigating *specific* cases is redundant. More generally, applying additional economic analysis, will improve the *quality of assessment* of a conduct of type k[68] for as long as the amount utilized is below the optimal level associated with the Courts' optimal legal standard for that conduct. Assume that for any given conduct k and Substantive Standard (SS), Courts adopt legal standard $LS^{C,w}_k$ if the SS is welfarist. Assuming this for the moment and dropping superscript "w", if the CA uses LS^C_k then the function of the quality of its enforcement activities will satisfy the following:

$$
\begin{aligned}
&Q_k = Q_k(e_{k,LS_k}),\\
&\partial Q_k / \partial e_{k,LS_k} > 0, \partial^2 Q_k / \partial^2 e_{k,LS_k} < 0 . 0 \le e_k < \hat{e}^{C}_{k,LS_k}\\
&\partial Q_k / \partial e_{k,LS_k} = 0, e_k \ge \hat{e}^{C}_{k,LS_k}, \textit{and}\\
&Q_k(\hat{e}^{C}_{k,LS_k}) = \overline{Q}_{k,LS_k}\\
&\textit{if } LS_k = \widehat{LS}_k \textit{ then}\\
&Q_k(\hat{e}^{C}_{k,\widehat{LS}_k}) = \overline{Q}_{k,\widehat{LS}_k} > \overline{Q}_{k,LS_k} \forall LS_k \neq \widehat{LS}_k
\end{aligned}
\qquad (16)
$$

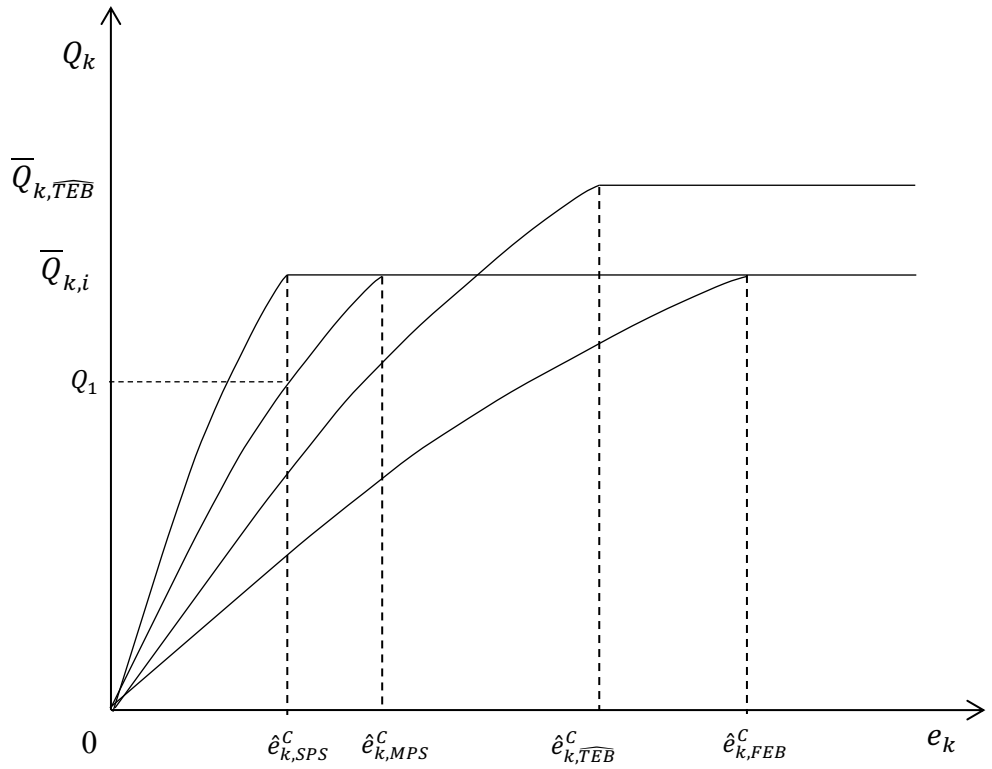
where

$\hat{e}^{C}_{k,LS_k}$ = the optimal level of e_k associated with the adoption by Courts of LS^C_k.

[68] And thus improves the welfare impact of enforcement in terms of decision errors and incentive (or deterrence) effects.

So increases in e_k by the CA beyond $\hat{e}^{C}_{k,LS_k}$ do not affect the quality of enforcement, that attains at $\hat{e}^{C}_{k,LS_k}$ its maximum value of $\overline{Q}_{k.LS_k}$ for any given LS_k. Note that the last part of (16) implies that maximizing the quality of enforcement need not be associated with the adoption of an effects-based LS. Generally, increasing the LS may be welfare reducing in terms of costs of decision errors and deterrence effects. Figure 2 below illustrates four potential cases of the function Q each of which is associated with different potential legal standards $LS_{k,i}, i = SPS, MPS, TEB, FEB$ that could be adopted by the Courts for conduct k. Given (16), the increase in Q_k as e^{C}_{k,LS_k} increases occurs at a diminishing rate. In Figure 2 we assume that $\hat{e}^{C}_{k,\widehat{LS_k}} = \hat{e}^{C}_{k,\widehat{TEB}}$ to which corresponds $\overline{Q}_{k.\widehat{TEB}}$, while $\overline{Q}_{k,i} < \overline{Q}_{k.\widehat{TEB}}, i = FEB, SPS, MPS$. We note that, in Figure 2, moving from a TEB to a FEB LS, or from $\hat{e}^{C}_{k,TEB}$ to $\hat{e}^{C}_{k,FEB}$, reduces the welfare benefits of enforcement – perhaps because of an increase in decision errors with a FEB LS.

Figure 2



The Φ_k function

We take the functions $\Phi_{k,i}(e^{CA}_{k}), i = SPS, MPS, TEB, FEB$, which show the probability of annulment of an infringement decision on conduct k, *given the LS*

adopted by the Courts, to be declining step functions of e_k^{CA} for any given LS_k, that have the properties indicated in expressions (17) below, and discussed immediately after. We assume that the SS is welfarist and drop superscript "w", except for (17g) and (17h) where we compare the properties of Φ under welfarist and consumer choice (CC) SS.

$$\Phi_{k,i}(0 \le e_k^{CA} < \underline{e}_k = \hat{e}_{k,SPS}^{C}) = \overline{\Phi} = 1, i = SPS, MPS, TEB, FEB \quad (17a)$$

$$\Phi_{k,SPS}(\hat{e}_{k,SPS}^{C}) = \widehat{\Phi}_{SPS} < \Phi_{k,MPS}(\hat{e}_{k,\text{MPS}}^{C}) = \widehat{\Phi}_{MPS} < \Phi_{k,TEB}(\hat{e}_{k,\text{TEB}}^{C}) = \widehat{\Phi}_{TEB}$$

$$< \Phi_{k,FEB}(\hat{e}_{k,\Phi\text{EB}}^{C}) = \widehat{\Phi}_{FEB} < \overline{\Phi} \ (17b)$$

$$\Phi_{k,i}(e_k^{CA} \ge \hat{e}_{k,i}^{C}) = \Phi_{k,i}(\hat{e}_{k,i}^{C}), i = SPS, MPS, TEB, FEB \quad (17c)$$

$$\widehat{\Phi}_{k,SPS} < \Phi_{k,MPS}(\hat{e}_{k,SPS}^{C} \le e_k^{CA} < \hat{e}_{k,MPS}^{C}) = \Phi_1 < \Phi_{k,TEB}(\hat{e}_{k,SPS}^{C} \le e_k^{CA} < \hat{e}_{k,MPS}^{C}) = \Phi_2$$

$$< \Phi_{k,FEB}(\hat{e}_{k,SPS}^{C} \le e_k^{CA} < \hat{e}_{k,MPS}^{C}) = \Phi_3 (17d)$$

$$\widehat{\Phi}_{k,MPS} < \Phi_{k,TEB}(\hat{e}_{k,MPS}^{C} \le e_k^{CA} < \hat{e}_{k,TEB}^{C}) = \Phi_4 < \Phi_{k,FEB}(\hat{e}_{k,MPS}^{C} \le e_k^{CA} < \hat{e}_{k,TEB}^{C}) = \Phi_5 (17e)$$

$$\widehat{\Phi}_{k,TEB} < \Phi_{k,FEB}(\hat{e}_{k,TEB}^{C} \le e_k^{CA} \le \hat{e}_{k,FEB}^{C}) = \Phi_6 \ (17f)$$

$$\widehat{\Phi}_{k,i}^{CC} \le \widehat{\Phi}_{k,i}^{w}, i = SPS, MPS, TEB, FEB \ (17g)$$

$$\widehat{\Phi}_{k,i+}^{CC} - \widehat{\Phi}_{k,i}^{CC} < \widehat{\Phi}_{k,i+}^{w} - \widehat{\Phi}_{k,i}^{w}, i = SPS, MPS, TEB, FEB \ (17h)$$

Thus we have the following properties that we further justify below:

(i) (17a) says that there is maximum probability of annulment $\overline{\Phi}$ which is the probability with which infringement decisions will be annulled if economic analysis used is lower than $\underline{e}_k = \hat{e}_{k,SPS}^{C}$. Below we will assume that this is simply unity.

(ii) (17b) says that, at the optimal level of economic analysis associated with any given legal standard, the associated probability of annulment increases with the legal standard (it is lowest under SPS and highest under FEB which is however associated with a probability of annulment less than $\overline{\Phi}$). That is, in Figure 3, point D is above and to the right[69] of point B, point K above and to the right of point D and point N above and to the right of point K.

(iii) (17c) says that increasing the amount of economic analysis beyond its optimal level $\hat{e}_{k,i}^{C,w}$, for any given legal standard will not affect the probability of annulments under that legal standard.

(iv) (17d, e and f) say that the probability of annulment is higher the higher the legal standard for e_k^{CA}, $\hat{e}_{k,SPS}^{C} \le e_k^{CA} \le \hat{e}_{k,FEB}^{C}$.

(v) (17g) says that under a non-welfarist substantive standard (such as, a Consumer Choice (CC) substantive standard), the probability of annulment Φ

[69] Given also the inequalities in (8).

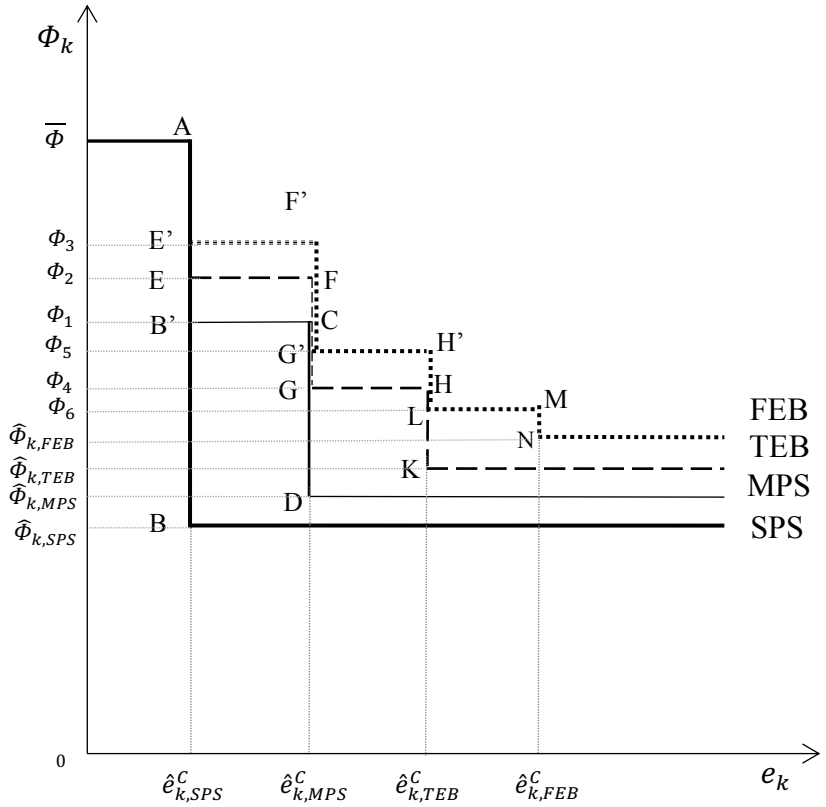
under any given legal standard $LS_{k,i}, i = SPS, MPS, TEB, FEB$ will be lower than under a welfarist substantive standard.

(vi) Finally, (17h) says that, for any given e_k^{CA}, the distance of two Φ curves representing any two neighboring legal standards $LS_{k,i}$ and $LS_{k,i+}$ will be smaller with a (CC) non-welfarist substantive standard than with a welfarist substantive standard.

We comment on properties (17g) and (17h) in the next sub-section under Lemma 2.

Figure 3 below illustrates expressions (17) – under an welfarist substantive standard[70].

Figure 3



$\overline{\Phi}AB(SPS)$: $function\ \Phi(e)\ with\ SPS\ Legal\ Standard\ (LS)$

$\overline{\Phi}AB'CD(MPS)$: $function\ \Phi(e)\ with\ MPS\ LS$

$\overline{\Phi}AEFGHK(TEB)$: $function\ \Phi(e)\ with\ TEB\ LS$

$\overline{\Phi}AE'F'G'H'LMN(FEB)$: $function\ \Phi(e) with\ FEB\ LS$

[70] We should remind the reader and stress that this Figure shows the probability of annulment perceived by the CA when the Court is known to use a given legal standard.

The following Lemma follows immediately:

Lemma 1:

$e_{k,i}^{CA,w} \leq \hat{e}_{k,i}^{C,w}, i = SPS, MPS, TEB, FEB$

that is, CAs will never use economic analysis and evidence beyond $\hat{e}_{k,i}^{C,w}$ (the amount considered appropriate by Courts) for any given $LS_{k,i}$ [71]. This follows directly from (17c) and (15) - the fact that AC_k is increasing in e_k^{CA}.

The most important features of the $\Phi_{k,i}$ functions depicted in Fig. 3 are that the functions are non-increasing (constant or decreasing) with e_k^{CA} up to $\hat{e}_{k,i}^{C}$ *for any given* $LS_{k,i}, i = SPS, MPS, TEB, FEB$. And that, as we move to a higher LS_k the functions shift up for all $e_k \geq \underline{e}_k = \hat{e}_{k,SPS}^{C}$, so the probability of annulment increases for all $e_k \geq \underline{e}_k = \hat{e}_{k,SPS}^{C}$ as the LS_k increases. The plausibility of the first feature is easy to understand. Given the LS_k, as the CA reduces the extent of e_k^{CA} away from the optimal level we expect that Courts will reverse the CA's decisions with greater probability.

The plausibility of the second feature (encapsulated in 17b, d, e, f) is based on the following arguments. First, we note that, given the legal standards adopted by Courts, any amount of economic analysis and evidence utilized by the CA beyond what the Courts would consider as the appropriate level of economic analysis and evidence $\hat{e}_{k,i}^{C}$, can and will be neglected by Courts and will not affect the probability of decision annulment (as shown by (17c)). Secondly, while the CA knows the methodologies, tests and potential models that have to be used under, for example, a truncated EB, it may not undertake them in the best / most appropriate / most satisfactory / adequate way as judged by the Court – something that would not arise if the economics used were minimal and simpler as under Modified Per Se, and something that would occur with an even greater probability if the courts used the more complex economic analysis associated with full EB[72]. Essentially, *increasing economic analysis and moving towards EB increases the disputability by Courts of the assessments made by the CA*.

The point is that when the legal standard is relatively low (or of Per Se type) and the application of economics in specific investigations limited, both CA and Courts reach decisions on the basis of general presumptions about the conduct for fairly general populations of this conduct type. Shifting the legal standard towards more

[71] Saying that the CA knows the values of e associated with a specific legal standard that the CA expects to be used by the Courts, we mean that the CA will know the type of tests, evidence and economic analysis (e.g. models for showing foreclosure or consumer harm or economic arguments that can be used to show the presence of efficiencies), that the Court is likely to associate with assessment under this legal standard.

[72] Requiring the application of specific theoretical modeling and/or econometric testing for which there is often far from unanimous acceptance in relation to their reliability or robustness.

effects-based[73] in investigations of conduct of some type k, will require increasing the amount and, usually, the complexity and sophistication of economic analysis and evidence used by the CA. This can increase the probability of annulment by Courts, because it may well imply that it is not possible then to devise a succinctly defined *pre-specified set of easily identifiable and, more or less, unanimously accepted criteria or conditions and tests* on the basis of which the assessment leads to conclusions that are very difficult to dispute. Thus, there is an increase in the disputability of the assessment conclusions – as the Courts can, when evaluating the CA's decision, consider additional or different criteria, tests, models and interpretations to those used by the CA, or, at least, it is more likely for the Courts to enquire whether the CA's analysis *"is capable of substantiating the conclusions drawn from it"*[74]. Note that this is in no sense contradicted by the fact that historically Courts have sometimes asked for a higher legal standard in assessing specific conducts[75], taking into account the most recent developments in economic theory and evidence. Requiring a move towards an effects-based standard as a prerequisite for establishing that the required standard of proof is reached, does not mean that the increased economic evidence associated with the higher legal standard will not be challenged with a higher probability than the evidence associated with a lower standard[76].

2.6 The effect of the substantive standard on the Q and Φ functions

Above we have been assuming that the criterion for deciding whether there is violation of CL, the substantive (or, liablity) standard is that of welfare. But, as already noted above[77], the substantive standard will, in practice, often be non-welfarist and, in particular, in (continental) Europe the SS has been to "protect the economic freedom of market participants", or, the pursuit of a "system of undistorted competition" (Wils, 2014), without obligation to show adverse effects on consumer

[73] It is useful to be reminded that, as noted in the Introduction, we refer by an "increase" in the standard or moving to a "higher" standard" to a shift in legal standard towards full effects-based.

[74] Hellstrom (2009), ab.cit. p.7. While this may be more common under the standard of judicial review applied in, for example, USA, it is also important in EU. Thus, as noted by Hellstrom (2009), the CFI in *JFE Engineering* stated that "the Commission must produce sufficiently precise and consistent evidence to support the firm conviction that the alleged infringement took place". Also, as CFI stated in the more recent *Microsoft* judgment: "The Community Courts must not only establish whether the evidence put forward is factually accurate, reliable and consistent but must also determine whether that evidence contains all the relevant data that must be taken into consideration in appraising a complex situation *and whether it is capable of substantiating the conclusions drawn from it*" (ab.cit. p. 6 – 7, our italics).

[75] A famous recent example is that concerning RPM in the *Leegin* case in which the US Supreme Court decided that a Per Se assessment cannot be accepted and a more effects-based approach should be applied.

[76] The above remarks are expected to apply with even greater force when there is no tradition in the application of economic analysis and evidence in legal proceedings and, specifically, in CL enforcement, especially when the latter surpasses a certain amount of sophistication and complexity. Also when judges lack any formal training in economics and the necessary relevant experience in assessing economic arguments. These will certainly tend to hold in the relatively newer jurisdictions like those of for example the BRICS and other developing countries but may well hold too, at least to some extent, in more mature jurisdictions (e.g. of the EU) in which the legal tradition is not one that is receptive to economic arguments in substantive evaluations of CL cases.

[77] Section 1.2.

welfare or efficiency (Rey and Venit, 2015). We can, alternatively, term this a Consumer Choise (CC) substantive standard (SS)[78].

The first thing to note about using a CC liability standard is that its adoption implies that using a "full effects-based" legal standard will require the application of less economic analysis, since just an "exclusionary effect" has to be established now rather than an "welfare effect". To clarify this consider for example abuse of dominance conducts. For these conducts, under a CC SS, liability is established just by showing that the conduct is exclusionary[79]. This can in principle be established with a Per Se (or with a MPS) LS or with a more effects-based LS[80]. But, in the last case what is required is showing, in each specific case investigated, whether the conduct in that case is expected to be exclusionary, *without* need to establish presumption of a negative welfare impact. While, with an welfarist SS and a TEB LS, we need to show that the specific conduct is exclusionary *and as a result it can be presumed* that it has a negative welfare impact. Thus for conducts that with an WSS it would be considered appropriate to use the economic analysis and evidence associated with a TEB LS, under a CC SS not all of this economic analysis and evidence will be required. This is one reason why with (non-welfarist) CC SS the amount of economic analysis and evidence utilized by CAs will be smaller. We express this is the following Lemma.

Lemma 2:

Under a CC SS the optimal LS_k^C and associated optimal level of $\hat{e}_k^C$ will be lower than under an welfarist SS.

Proof: This can be demonstrated using Figure 4. If, for example, under an welfarist SS (WSS), the TEB LS was considered appropriate by Courts for a conduct, with an optimal $e_k^{CA} = \hat{e}_{k,TEB}^{C,w}$, so that, with this e_k^{CA} the CA would establish *welfare-reducing* exclusion, the optimal e_k^{CA} for establishing *just* exclusion[81] under a CC SS will clearly be lower: the amount of e_k^{CA} required to show *welfare-reducing* exclusion is *larger* than the amount required to show that the conduct will *just* result in exclusion. To put it otherwise, under a CC SS the Q_k function tilts leftward as shown in Figure 4 below. The Figure shows the case of a conduct k for which under a WSS the TEB LS with $e_k^{CA} = \hat{e}_{k,TEB}^{C,w}$ would be considered optimal and shows the value of e_k^{CA}, $e_k^{CA} = \hat{e}_{k,FEB}^{C,CC}$ that would be required if an "effects-based" LS was adopted under a CC SS (with

[78] See, for example, Coniglio (2017).

[79] Or a showing that there is a market power raising effect by the conduct. In this sense Wils (2014) was right to claim that the Commission and Court used an *effects-based approach*: except, that the "effect" that they tried to establish was the effect on competitors (or, consumer choice) rather than the effect on welfare.

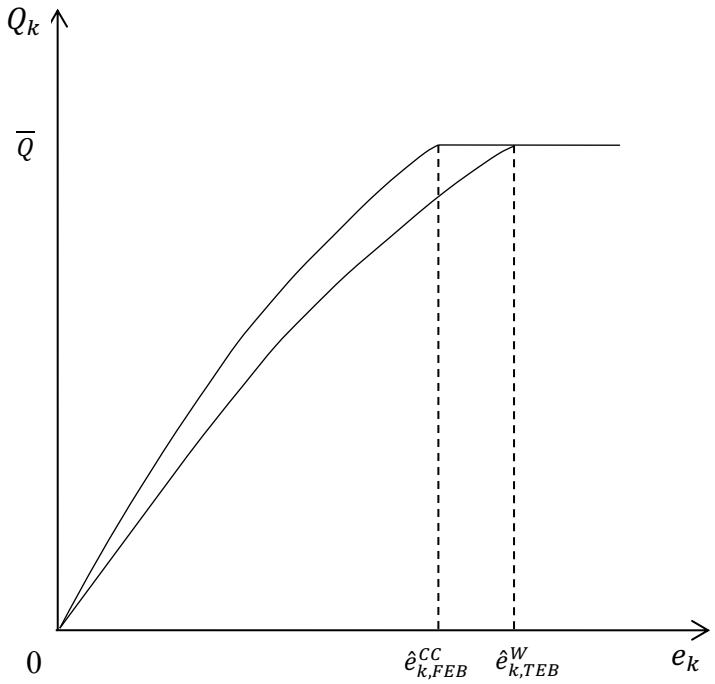
[80] As defined above, with a TEB LS, decisions about whether or not there is liability *in terms of the impact of the conduct on welfare*, in the case of a specific conduct, are reached on the basis of a presumption, about the effects of a class of conducts of this type and of market characteristics, specifically, that this class is expected to distort the competitive process by disadvantaging rivals (i.e. through exclusionary effects, widely defined) or by enhancing market power (as in a concerted practice case).

[81] Not necessarily welfare reducing.

"effects" signifying "exclusionary effects" rather than "welfare effects"). Under a CC SS an e_k^{CA} equal to $e_k^{CA} = \hat{e}_{k,FEB}^{C,CC}$ would be the maximum e_k^{CA} that a CA would apply in investigations of this conduct type. We assume for simplicity that (omitting superscript "C"), $\overline{Q}_k(\hat{e}_{k,TEB}^{w}) = \overline{Q}_{k.}(\hat{e}_{k,FEB}^{CC})$.

Finally, we can show that with a CC SS, the Courts (and the CA) will have incentives to use a lower LS (or use with greater probability an SPS or an MPS LS) than would be the case under a welfarist SS. This is established in Proposition 4 below.

Figure 4



Turning to the Φ functions these are also affected when a non-welfarist (e.g. a CC) SS is adopted. For future reference we express this effect as a Lemma:

Lemma 3:

From the discussion just above, the Φ function that corresponds, under a WSS, to the use of a FEB LS, is no longer relevant under a CC SS, that is:

(i) $\Phi_{k,FEB}$ is not relevant any more. Further:

(ii) the other Φ_k curves shift down and also come closer to each other.

(i) and (ii) are the properties of the Φ functions expressed by (17g) and (17h) above. These properties are reasonable as, disputability between CAs and Courts is not as high under a non-welfarist than under a WSS: when higher legal standards are used, disputability will be higher if the ultimate objective is to identify (or be able to

presume) harm to welfare, than if the ultimate objective is to show (or be able to presume) that a rival has been excluded or disadvantaged and so there is just a reduction in CC.

3. Optimal legal standards (and economic evidence) and optimal choice of decisions

3.1 Optimal legal standards (and economic evidence)

3.1.1 The Reputation Effect (RE) of Economic Evidence

To determine the optimal economic analysis and evidence utilized by the CA in assessing some conduct type, we use the following version of the utility function (3), for conduct k when some LS_k is adopted:

$$U_k = Q_k(e_k(LS_k))R_k(S_k(D_k, e_k(LS_k))), k = 1,....K \quad (3')$$

Further, we simplify by assuming that:

$$R_k(S_k(D_k, LS_k)) = f(D_k)S_k(D_k, e_k(LS_k)) = f(D_k)D_k(1-\Phi_k(e_k(LS_k))), k = 1,....K \quad (18)$$

and that:

$$f(D_k) = (\frac{1}{\alpha})D_k^{\alpha-1}, \alpha \leq 1 \quad (19)$$

So assuming, in this section, without loss of generality, that α = 1 we have the following utility function:

$$U_k = D_k[(1-\Phi_k(e_k(LS_k)))]Q_k(e_k(LS_k)), k = 1,....K \quad (20)$$

Note that, according to (20), a *pure-reputation maximizing* CA (henceforth indicated by superscript CA-R), which does not take into account, when selecting LS and e, the impact of its choices on the quality of enforcement, will choose e by maximizing reputational enforcement success $S_k(D_k, LS_k) = D_k(1-\Phi_k)$, minus, of course, the cost of enforcement. More generally, the CA will adopt the LS and the amount of economic analysis and evidence that maximize the difference between U_k, given by (20), and C_k. That is, the optimal choice of LS_k and hence, of e_k^{CA} will be given by[82]:

$$\max_{LS_k}\{U_k - C_k\}, or:$$
$$\max_{LS_k}\{D_k[(1-\Phi_k(e_k^{CA}(LS_k))Q_k(e_k^{CA}(LS_k)) - AC(e_k^C(LS_k)]\} \quad (21)$$

and, for a CA that neglects the influence of its choices on the quality of enforcement, this is:

$$\max_{LS_k}\{D_k[(1-\Phi_k(e_k^{CA}(LS_k)) - AC(e_k^C(LS_k)]\} \quad (21')$$

We can use the term *Average Reputation Effect* (ARE) to indicate:

[82] Using also (14) – neglecting superscript "D" in the AC function.

$$ARE_k(e_k^{CA}(LS_k)) = (1 - \Phi_k(e_k^{CA}(LS_k)) \quad (22)$$

so that (21) becomes:

$$\max_{LS_k}\{D_k[ARE_k(e_k^{CA}(LS_k))Q_k(e_k^{CA}(LS_k)) - AC_k^D(e_k^{CA}(LS_k))]\} \quad (23)$$

and (21') becomes:

$$\max_{LS_k}\{D_k[ARE_k(e_k^{CA}(LS_k)) - AC(e_k^C(LS_k)]\} \quad (23')$$

where ARE_k is given by (22). So we have:

Lemma 4:

The functions $ARE_{k,i}, i = SPS, MPS, TEB, FEB$ have the following properties:

$$ARE_{k,i}(0 \le e_k^{CA} < \underline{e}_k = \hat{e}_{k,SPS}^C) = 1 - \overline{\Phi} = 1, i = SPS, MPS, TEB, FEB \quad (24a)$$

$$\widehat{ARE}_{k,SPS}(\hat{e}_{k,SPS}^C) = 1 - \hat{\Phi}_{SPS} > \widehat{ARE}_{k,MPS}(\hat{e}_{k,MPS}^C) = 1 - \hat{\Phi}_{MPS} > \widehat{ARE}_{k,TEB}(\hat{e}_{k,\mathrm{TEB}}^C)$$

$$= 1 - \hat{\Phi}_{TEB} > \widehat{ARE}_{k,FEB}(\hat{e}_{k,\Phi\mathrm{EB}}^C) = 1 - \hat{\Phi}_{FEB} > 1 - \overline{\Phi} \quad (24b)$$

$$ARE_{k,i}(e_k^{CA} \ge \hat{e}_{k,i}^C) = ARE_{k,i}(\hat{e}_{k,i}^C), i = SPS, MPS, TEB, FEB \quad (24c)$$

$$\widehat{ARE}_{k,SPS} > ARE_{k,MPS}(\hat{e}_{k,SPS}^C \le e_k^{CA} < \hat{e}_{k,MPS}^C) = ARE_1 > ARE_{k,TEB}(\hat{e}_{k,SPS}^C \le e_k^{CA} < \hat{e}_{k,MPS}^C) =$$

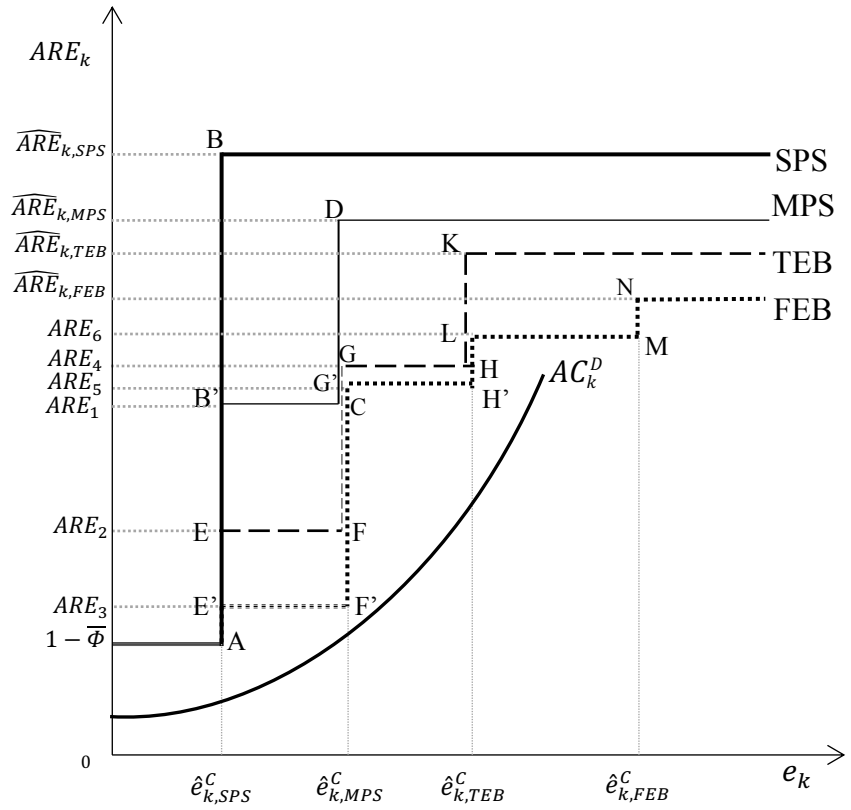
$$ARE_2 > ARE_{k,FEB}(\hat{e}_{k,SPS}^C \le e_k^{CA} < \hat{e}_{k,MPS}^C) = ARE_3 \quad (24d)$$

$$\widehat{ARE}_{k,MPS} > ARE_{k,TEB}(\hat{e}_{k,MPS}^C \le e_k^{CA} < \hat{e}_{k,TEB}^C) = ARE_4 > ARE_{k,FEB}(\hat{e}_{k,MPS}^C \le e_k^{CA} < \hat{e}_{k,TEB}^C) = ARE_5 (24e)$$

$$\widehat{ARE}_{k,TEB} > ARE_{k,FEB}(\hat{e}_{k,TEB}^C \le e_k^{CA} \le \hat{e}_{k,FEB}^C) = ARE_6 \ (24f)$$

Proof: The properties of the ARE functions follow immediately from (22) and (17). The ARE functions are shown in Figure 5 with the AC function.

Figure 5



$ARE_{SPS} = (1-\overline{\Phi})AB(SPS)$

$ARE_{MPS} = (1-\overline{\Phi})AB'CD(MPS)$

$ARE_{TEB} = (1-\overline{\Phi})AEFGHK(TEB)$

$ARE_{FEB} = (1-\overline{\Phi})AE'F'G'H'LMN(FEB)$

The optimal LS_k for a CA-R, and optimal $\hat{e}_k^{CA-R}$, is given from (23') by

$$\hat{e}^{CA-R}_{k,\widehat{LS}_k^{CA}}(\widehat{LS}_k^{CA}) = \max_{LS_k^{CA}}[ARE_k(e_k^{CA}(LS_k^{CA})) - AC_k^D(e_k^{CA}(LS_k^{CA}))] \qquad (24)$$

From Lemma 4 and Figure 5 we can now get the following results.

Proposition 1: Optimal legal standard and economic analysis utilized by CA under uncertainty (young jurisdictions).

(i) *Reputation maximizing CA*: Consider first a reputation-maximizing CA, in a new jurisdiction in which it is not possible for the CA to know with certainty

what legal standard will be considered by the Courts as the right standard for any given conduct[83]. Assume that the CA anticipates that the Court will use one between two neighboring standards (i and i+) with equal probability. Then the CA will maximize its anticipated net utility by choosing the *lower standard* (i) for as long as AC_k^D is sufficiently convex relative to the increase in the probability of annulment when the CA uses the (wrong) lower standard.

Proof:

Assume that the CA expects that Courts will adopt legal standard i or legal standard i+ with probability (1/2). Then its expected net utility by choosing legal standard i will be:

$$(1/2)[ARE_{k,i}(\hat{e}^C_{k,i}) - AC_k^D(\hat{e}^C_{k,i})] + (1/2)[ARE_{k,i+}(\hat{e}^C_{k,i}) - AC_k^D(\hat{e}^C_{k,i})]$$

$$= (1/2)[1-\Phi_{k,i}(\hat{e}^C_{k,i}) - AC_k^D(\hat{e}^C_{k,i})] + (1/2)[1-\Phi_{k,i+}(\hat{e}^C_{k,i}) - AC_k^D(\hat{e}^C_{k,i})]$$

Comparing this with the expected net utility if the CA adopts legal standard i+ and given that from (17c) we know that, for $\hat{e}^C_{k,i+} > \hat{e}^C_{k,i}$:

$$\Phi_{k,i}(\hat{e}^C_{k,i}) = \Phi_{k,i}(\hat{e}^C_{k,i+})$$

we get that the CA will prefer to use legal standard i (rather than i+) iff:

$$2[AC_k^D(\hat{e}_{k,i+}) - AC_k^D(\hat{e}_{k,i})] > ARE_{k,i+}(\hat{e}_{k,i+}) - ARE_{k,i+}(\hat{e}_{k,i}) \qquad (25)$$

or:

$$2[AC_k^D(\hat{e}_{k,i+}) - AC_k^D(\hat{e}_{k,i})] > \Phi_{k,i+}(\hat{e}_{k,i}) - \Phi_{k,i+}(\hat{e}_{k,i+}) \qquad (25')$$

that is, for as long as the increase in AC_k^D as a result of using standard i+ rather than standard i is sufficiently large relative to the increase in the probability of annulment when the CA applies the economic analysis that would be optimal under the lower standard i, when the standard used by Courts is i+.

If, for example, i = SPS and i+ = MPS, then (25') above is:

$$2[AC_k^D(\hat{e}_{k,MPS}) - AC_k^D(\hat{e}_{k,SPS})] > \Phi_{k,MPS}(\hat{e}_{k,SPS}) - \Phi_{k,MPS}(\hat{e}_{k,MPS}) \qquad (26)$$

or using Figure 3:

$$2[AC_k^D(\hat{e}_{k,MPS}) - AC_k^D(\hat{e}_{k,SPS})] > distance(B'-D)$$

If, on the other hand, (26) does not hold, then the CA will prefer to adopt i+ (even though the Court may be using standard i).

[83] Like the jurisdictions of the BRICS (with the exception of South Africa) or the jurisdictions of many developing countries and, a few years ago, those in Central – Eastern Europe that developed recently competition policy regimes.

(ii) *Non-reputation maximizing CA*: If the CA in the above case, in which the CA does not know exactly what legal standard Courts will adopt for any give conduct type, takes into account the impact of its choices on the quality of enforcement, then it is much less likely that it will choose the lower standard (than it would do if it were a CA-R).

Proof:

In this case the CA:

$$\max_{e_k^{CA}}[ARE_k(e_k^{CA})Q_k(e_k^{CA}(LS_k)) - AC_k^D(e_k^{CA})]$$

Then, assuming that i = SPS and i+ = MPS and using also Figure 2, its expected net utility by choosing legal standard i = SPS will be:

$$(1/2)[ARE_{k,SPS}(\hat{e}_{k,SPS}^C)\overline{Q} - AC_k^D(\hat{e}_{k,SPS}^C)] + (1/2)[ARE_{k,MPS}(\hat{e}_{k,SPS}^C)Q_1 - AC_k^D(\hat{e}_{k,SPS}^C)]$$

$$= (1/2)[(1-\Phi_{k,SPS}(\hat{e}_{k,SPS}^C))\overline{Q} - AC_k^D(\hat{e}_{k,SPS}^C)] + (1/2)[(1-\Phi_{k,MPS}(\hat{e}_{k,SPS}^C))Q_1 - AC_k^D(\hat{e}_{k,SPS}^C)]$$

which will be higher than expected net utility if CA adopts i+ = MPS, iff:

$$2[AC_k^D(\hat{e}_{k,MPS}) - AC_k^D(\hat{e}_{SPS})] > ARE_{MPS}(\hat{e}_{k,MPS})\overline{Q} - ARE_{k,MPS}(\hat{e}_{SPS})Q_1 \qquad (27)$$

where $\overline{Q} = \overline{Q}_{k,i} > Q_1$ in Figure 2. Comparing (25) and (27) the result follows.

Proposition 2: Optimal legal standard and economic analysis utilized by CA under certainty (mature jurisdictions).

(i) *Reputation maximizing CA*: In a mature jurisdiction in which the CA knows with certainty the legal standard that will be adopted by Courts (say i), if the CA is reputation maximizing then it will adopt the same OR a lower LS. However, the likelihood that it adopts a lower standard is much smaller than if the CA makes its choice under uncertainty. Thus lower standards are anticipated to be adopted more often in young, rather than in mature, jurisdictions.

Proof:

The CA will never choose a *higher* standard than it anticipates to be used by Courts since this will increase AC_k^D and will simultaneously reduce ARE_k.

The CA will maximize its anticipated net utility by choosing to apply the economic analysis associated with the *lower* legal standard (i), when Courts adopt i+, for as long as:

$$ARE_{k,i+}(\hat{e}_{k,i}^C) - AC_k^D(\hat{e}_{k,i}^C)] > ARE_{k,i+}(\hat{e}_{k,i+}^C) - AC_k^D(\hat{e}_{k,i+}^C)] \qquad (28)$$

or

$$AC_k^D(\hat{e}_{k,i+}) - AC_k^D(\hat{e}_{k,i}) > \Phi_{k,i+}(\hat{e}_{k,i}) - \Phi_{k,i+}(\hat{e}_{k,i+}) \qquad (28').$$

If for example the CA knows that the Courts consider TEB as appropriate for conduct k then it will choose MPS if:

$$AC_k^D(\hat{e}_{k,TEB}) - AC_k^D(\hat{e}_{k,MPS}) > \Phi_{k,TEB}(\hat{e}_{k,MPS}) - \Phi_{k,TEB}(\hat{e}_{k,TEB})$$

Thus while a CA in a mature jurisdiction is less likely to choose a lower standard than that used by Courts, than would be the case in a young jurisdiction[84], it is still possible that it will do so for as long as AC_k^D is sufficiently convex. For example, in Figure 5, we note that (28) will hold in a comparison of legal standards MPS = i and TEB = i+. We see that in Figure 5:

$$ARE_{k,i+}(\hat{e}^C_{k,i}) - AC_k^D(\hat{e}^C_{k,i}) = ARE_{k,TEB}(\hat{e}^C_{k,MPS}) - AC_k^D(\hat{e}^C_{k,MPS})$$

is the distance $G - AC_k^D(\hat{e}^C_{k,MPS})$ and this is greater than $ARE_{k,TEB}(\hat{e}^C_{k,TEB}) - AC_k^D(\hat{e}^C_{k,TEB})$ which is the distance $K - AC_k^D(\hat{e}^C_{k,TEB})$.

Further, another reason why in young jurisdictions it is more likely for the CA to choose lower standards, i.e. for (28') being more likely to hold that (25'), is that the AC function is likely to be more convex in such cases.

(ii) *Non- reputation maximizing CA*: Again, as under Proposition 1, part (ii), when the CA makes its choice of legal standard anticipating with certainty what will be adopted by Courts, the above result (i) is less likely to hold if the CA is not pure reputation maximizing, that is, when it takes into account the impact of its choice on the quality of enforcement.

Corollaries of Propositions 1 and 2:

Corollary 1:

Conducts the assessment of which is more data intensive or for which specialized economic or econometric knowledge has to be used with higher legal standards will have more convex AC_k^D, and thus will be more likely to satisfy (25) or (28). For these conducts lower legal standards are more likely to be used than the optimal.

Corollary 2:

Conducts for which CAs will be less well informed about the standards adopted by Courts – because they may be occurring less often - and for which therefore the CAs will be making choices under uncertainty will be conducts for which it is more likely to be assessed by CAs using lower standards than optimal (for these conducts condition (25) rather than (28) will apply).

Corollary 3:

As CAs become (a) more productive over time (which will reduce the convexity of the AC function), or (b) become better informed about the standards adopted by Courts, this may well tend to increase the legal standard adopted. In case (a), (25) may cease to hold so the CA will shift to a higher standard, while in case (b), condition (28),

[84] Compare (28') to (25') assuming that the legal standards compared are the same in the two cases.

rather than (25) will become the relevant condition again allowing the CA to shift to a higher standard.

Corollary 4:

An increase in the legal standard adopted by Courts over time, may not always increase the standard and hence amount of economic analysis and evidence used by a CA-R. For example, if Courts shift from a TEB LS under which, say, $\hat{e}_k^{CA-R} = \hat{e}_{k,TEB}^{C}$, to a FEB LS, this does not imply that the CA will increase e to $\hat{e}_k^{CA-R} = \hat{e}_{k,FEB}^{C}$, though this is more likely to be the case for a CA that takes into account the impact of its choices on the quality of enforcement.

Proposition 3:

An (empirically testable) result emerging from our framework is that the observed probability of annulment is non-monotonic to increasing e_k^{CA}.

Proof:

When a CA is uncertain about the legal standard chosen by Courts (Proposition 1), or, with certainty, under sufficiently convex AC_k^D (Proposition 2), it may choose, a lower legal standard for some conducts than the legal standard adopted by Courts for these conducts (for example, SPS rather than MPS). This makes the probability of annulment for these cases higher than the probability of annulment when the higher legal standard (e.g. MPS, associated with an increased utilization of economic analysis and evidence) is used for some other cases, for which the Courts also use the higher legal standard (MPS) – thus, the probability of annulment is at B' (in Figure 3) when a SPS is used by the CA but a MPS by the Courts, while the probability of annulment is at (the lower value of) D when the CA uses a MPS as does the Court. Thus, here, data will show that the probability of annulment decreases with a higher legal standard (higher utilization of economic analysis).

On the other hand, if the CA increases the legal standard used and the amount of economic analysis, by choosing always the same legal standards as that adopted by Courts, this will *increase* the probability of annulment as the legal standard increases. In Figure 3, the probability of annulment is at point B if the Court's and CA's choice is SPS while it is at point D if the Court's and CA's choice is MPS.

Proposition 4:

Comparing jurisdictions in which Courts have non-welfarist, with jurisdictions in which Courts have welfarist, Substantive Standards, CAs in the former will tend to adopt lower (closer to Per Se) legal standards and less economic analysis.

Proof:

There are two reasons for this. The first is that when Courts' SS is non-welfarist their legal standard will be lower (as shown in section 2.6, Lemma 2) and, if Courts use lower legal standards, the CAs will follow lowering their standards in the same way, or

even more so (as shown in Propositions 1 and 2). The second is that the likelihood of a CA adopting a lower legal standard than Courts is higher when the Courts adopt a non-welfarist SS, because of (17g) and (17h) (from Lemma 3), which imply that the RHS of (25') and (28'), or (27)[85], will be smaller[86] which implies, in turn, that (25') or (28'), or (27), will be more likely to hold, so a lower legal standard is adopted by the CA. This result is very important for explaining the difference in the legal standards applied between US (welfarist Courts) and EU (non-welfarist Courts)[87] for a large range of conducts concerning vertical restraints and abuse of dominance.

In relation to the situation in EU our model can be used to explain the evidence presented by Geradin and Petit (2010), specifically in relation to DGCOMP decisions under Art. 102, which shows that DGCOMP employs relatively low legal standards (MPS legal standards in terms of our terminology) in abuse of dominance decisions that are then always upheld by the Courts. The authors criticize the Courts for not using (higher) legal standards, as the latest developments in economic theory and evidence suggest they should, annulling the decisions of DGCOMP[88]. However, according to our model one can interpret the choices of the European Courts as been absolutely the right ones *given the SS adopted, which is non-welfarist.* The choices of the DGCOMP to also use low legal standards should be seen as a rational optimal response to what they anticipate of the Courts. This interpretation is absolutely consistent with that of Wils (2014) position concerning the decision by DGCOMP and the CFI in the case of *Intel*[89].

3.2 Optimal choice of decisions reached on conduct k

3.2.1 Optimality conditions

To examine the optimal choice of investigations of, or decisions on, conduct k by the CA, when a given legal standard, $LS_{k,i}, i = SPS, MPS, TEB, FEB$, is adopted in these investigations, we start by noting that optimality requires that:

$$\frac{\partial U_k}{\partial D_k} = \frac{\partial C_k}{\partial D_k} = MC_k^D(e_k) = AC_k^D(e_k), k = 1,.....,K \qquad (29)$$

that is, at the optimum, the marginal cost of investigations / decisions reached on conduct k under LS_k must equal the marginal impact of the decision on the utility of

[85] For a CA that is non-reputation maximizing.
[86] According to Lemma 3, the distance between the Φ functions as the LS becomes higher, is smaller when the SS is non-welfarist.
[87] See Katsoulacos (2017) for a discussion of the differences.
[88] See page 6 and page 35.
[89] Reading carefully the reversal of the decision by the ECJ one sees that the ECJ considers that the (lower) General Court did not satisfactorily examine what was required in order to show that the liability standard that rivals were disadvantaged was satisfied. ECJ EU Press Release No 90/17, 6th September 2017 "Judgment in Case C-4 13/14 P Intel Corporation Inc. v. Commission.

the CA. From (3'), (18) and (19) we have (suppressing the dependence of Φ and Q on e_k^{CA}, LS_k):

$$U_k = (\frac{1}{\alpha})(D_k)^{\alpha}(1-\Phi_k)Q_k, \alpha < 1, k = 1,....K \qquad (30)$$

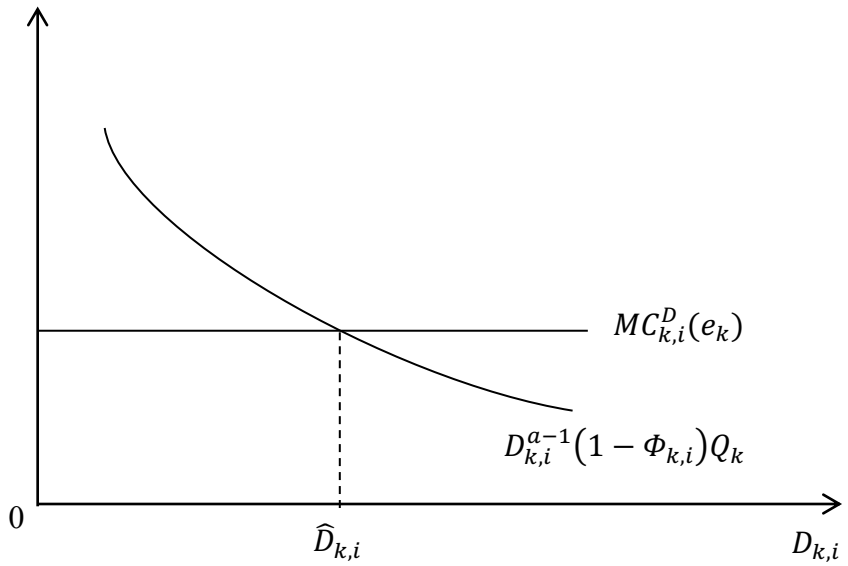
So:

$$\frac{\partial U_k}{\partial D_k} = (D_k)^{\alpha-1}(1-\Phi_k)Q_k > 0, \alpha < 1, k = 1,....K$$

$$\frac{\partial^2 U_k}{\partial (D_k)^2} < 0 \qquad (31)$$

Thus, additional decisions always increase the CA's utility but at a diminishing rate. Figure 6 below illustrates the optimal (unconstrained) number of decisions reached on conducts of type k ($\widehat{D}_k$).

Figure 6 : Optimal number of investigations / decisions



Proposition 5:

The optimal number of investigations on conducts of type k will be greater:

(i) The smaller the probability (Φ) that decisions on these investigations will be reversed in Courts of Appeal and hence the larger the average reputation effect of these decisions.

(ii) For the same reason, the greater the quality of enforcement and hence Q_k .

(iii) The lower the MC = AC of reaching a decision and appealing, as determined by (c_k^D, c_k^A).

(iv) The lower the probability (φ_k^A) that infringement decisions of conduct k lead to appeals since, *ceteris paribus*, this will make Φ smaller.

Proof: Obvious from condition (29) and (31) which imply that the optimal number of investigations is determined by:

$$D_k^{\alpha-1}[1-\Phi_k]Q_k = AC_k^D \qquad (32)$$

All parts of Proposition 5 follow immediately from (32) taking into account (14). An important corollary follows from Proposition 5:

Corollary to Proposition 5 (reputation maximizing CA):

Consider a reputation maximizing CA (CA-R) that in the assessment of conduct k uses the legal standard adopted by the Courts and the optimal amount of economic evidence associated with that legal standard. Then:

(i) The higher the legal standard used for conduct k the smaller the optimal number of investigations / decisions on this conduct that will be undertaken by a CA-R. Thus, the CA's optimal number of decisions on conducts assessed by higher legal standards will be smaller than the optimal number of decisions on conducts assessed by lower legal standards. Note that this result holds even if marginal costs are unaffected by an increase in legal standards.

Proof:

For a CA-R, a higher legal standard unambiguously increases Φ and reduces the *ARE* (the only factor that affects the utility of a CA-R), while it increases the *AC* of decisions; so, from (32), it reduces the optimal number of decisions. Even if AC were unaffected the increase in Φ induced by higher legal standards is sufficient to reduce the optimal number of decisions.

(ii) Comparing two jurisdictions, if on average the CA in one adopts lower legal standards than the other, because the former is younger or less experienced or its Courts adopt a non-welfarist SS, then the former jurisdiction will be associated with more enforcement in terms of the decisions reached by the CA.

Proof:

Using on average lower legal standards implies that the CA will face on average a lower Φ and this, given Proposition 5, will increase its optimal number of decisions.

If the CA takes into account the quality of enforcement too and this increases with the legal standard, then we cannot predict how a higher legal standard will affect the optimal number of decisions[90].

Comparing two jurisdictions in which the choice of legal standards differs quite markedly provides a confirmation of part (ii) of the above Corollary to Proposition 5.

[90] Since in this case, higher legal standard will increase both Φ and Q, it is not clear how this will affect the marginal utility curve in Figure 6.

In Russia between 2008 and 2015, the CA (FAS) reached a very large number of antitrust infringement decisions of which 1133 were appealed. For these decisions the legal standard adopted is close to Per Se. In South Africa over a longer period of time (from 2001 – 2016) only 27 antitrust infringement decisions were reached with legal standards approaching full effects- based[91]. Normalizing in terms of employees (about 3000 in FAS, about 200 in the South African Competition Commission, SACC) implies that FAS generates *at least* 2.8 times more decisions than SACC[92].

4. Concluding remarks, recommendations and future research

The modeling framework presented in this article can be used to explain the choice of legal standards when the choices of CAs are influenced by both the quality of enforcement and by its reputational success. Concern with reputation implies that CAs will take into account the judicial review process, specifically the Courts' choice of legal standards and the implications of their choices on the probability that Courts will annul their infringement decisions[93]. As a result, we have shown that they may apply sub-optimal economic analysis and evidence in antitrust investigations[94] and to favor legal standards closer to *Per Se* than to full effects-based. The same tendency to use lower legal standards will be associated with jurisdictions in which substantive standards that are non-welfarist are used. And, our analysis predicts, these tendencies will be more pronounced in younger jurisdictions in which the CAs are uncertain about Courts' choice of standards and face more convex marginal costs. This reconciles evidence indicating the unpopularity of standards with significant economic analysis content, with the fact that such standards seem likely to be superior on the basis of traditional error-cost minimization or welfare-maximization arguments.

Institutional adjustments and other measures could facilitate the expansion in the use of modern economic and econometric analysis and techniques in competition law enforcement. Among these we would put priority on the following:

(i) Explicitly incorporating into Competition Law provisions, *substantive standards* that are related to consumer welfare and efficiency.

(ii) Providing incentives to CAs through appropriate *performance criteria,* related to the welfare effects of enforcement activities, to make legal standard choices taking into account the implications of these choices for the quality of

[91] Using the methodology of Katsoulacos et. al (2017b), out of a maximum score of 8 (indicating full effects-based) the indicator of economic analysis and evidence has an average value a bit higher than 3 in Russia and of about 7 in South Africa.

[92] In FAS the number of decisions per employee is 0,377, while in the SACC it is 0,135, assuming that for FAS all infringement decisions are appealed.

[93] It is also important to reiterate that, often, explicit performance assessment of competition authorities relies on indicators related to reputational success, such as those measured by the ratio of non-reversed decisions to the overall number of decisions made. See, for a review of performance indicators of different agencies, Avdasheva et al. (2017).

[94] Even though they are well-staffed with trained scientific personnel.

enforcement (in terms of the wider social impact of enforcement, thus incorporating considerations related to error-cost minimization and deterrence/incentive effects).

(iii) Setting up *specialized tribunals* for dealing in the first instance with competition infringement appeals, some of the members of which should be, ideally, economists[95].

(iv) Even when specialized tribunals are not set-up, taking measures to improve the expertise of judges in handling / assessing economic theory arguments and evidence that would allow them to appreciate differences between and to design appropriate standards and reducing the uncertainty of CAs in relation to the standards that should be adopted (e.g. through *training programs* such as the ones that have been advocated for EU countries by the European Commission recently)[96].

While the main objective of the paper it to offer a conceptual framework for thinking about the choice of legal standards and the extent to which economic analysis is applied in investigations, by utility maximizing Competition Authorities influenced by potentially non-welfarist Courts and performance assessment criteria, many of our main predictions can be empirically tested using information extracted from decisions made by Competition Authorities that went through the appeal process. A first empirical analysis of a large set of (1133) appealed antitrust infringement decisions by the Russian Authority (FAS) that were appealed between 2008 – 2015 has been undertaken and results vindicate many predictions of the model above, while comparative empirical analysis to determine the type of legal standards adopted is currently under way in a number of other countries [97].

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[95] This would reduce the degree to which decisions are reversed on appeal because the judges are unable to discriminate, in terms of their quality, between sophisticated economic or econometric arguments. The Competition Appeals Tribunals of UK or South Africa provide good examples of such tribunals.

[96] See also Baye and Wright (2011) and Avdasheva et.al. (2015). Also and most importantly, these programs should aim to reduce uncertainty by developing commonly recognized and accepted procedures for taking into account economic analysis and evidence in substantive conduct assessments by Court judges and the CA.

[97] See Avdasheva et.al (2015) and Katsoulacos, Avdasheva and Golovanova (2016). The level of economic analysis applied is measured by a number of different indicators constructed on the basis of the information contained in the CA decisions. The authors have been pursuing empirical work using the above theoretical background and the methodology for constructing indicators in Katsoulacos, Avdasheva and Golovaneva (2017b) with research teams covering a number of countries including, the EC, Canada, Greece, France, South Africa and Turkey.

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